

THE
MONITOR

THE MONITOR

EXPLAINED

THE CLIMATE VULNERABILITY MONITOR

In mid 2010, the first Climate Vulnerability Monitor (or, “the Monitor”) was commissioned on the initiative of the founding chair of the Climate Vulnerable Forum, the Maldives, as an independent global study of the gathering climate change crisis. The Monitor provides a framework for understanding global vulnerability to climate-related concerns. It enables a weighing of the possible costs, benefits and needs associated with different ways to address this crisis. The framework is grounded in third-party research by dozens of other research groups and scientists assimilated in the Monitor.

Subtitled “The State of the Climate Crisis”, the first Monitor was issued in December 2010 in conjunction with the UN climate change talks in Cancún. DARA developed the report, and two external advisory bodies were formed to solicit wide-ranging third-party input. A second edition of the Monitor was subsequently commissioned in November 2011 at the Ministerial Meeting of the Climate Vulnerable Forum held in Dhaka, Bangladesh. DARA was mandated to develop the second edition of the Monitor, overseen by a joint Steering Group comprising Climate Vulnerable Forum and DARA officials and with continued input from external advisory bodies.

ITS PURPOSE

The Monitor was first assembled to contribute to a fuller understanding of the global climate crisis and to support communities facing serious challenges as a result of this emerging concern. It aims to inform the public and policymakers and help shape more effective climate change policies. The Monitor’s second edition essentially measures the global impact of climate change and the carbon economy in socio-economic terms, both for today and for the near future. In doing so, it reveals information that enables a comparison of the vulnerability of different countries around the world to climate-related effects. It highlights the key issues at hand, assesses the scale of the problem overall and in its different aspects and anticipates the

rates of change and the distribution of effects across various countries. The report is not an attempt to “predict” the future but to explore what implications current patterns of core economic and social activities hold for the near future. Its estimations of socio-economic impact should be considered broad indications as opposed to precision appraisals.

The Monitor is a country-level tool that also provides for sub-regional, regional, geopolitical and global analysis. The development of the Monitor’s second edition further benefitted from in-country research conducted in Ghana and Vietnam; key insights from these exercises are detailed in the relevant sections of this report and have also been used to support analysis elsewhere. The country studies provide an idea of how the Monitor’s information can be employed in national contexts. However, the Monitor is *not* a replacement for regional, national and sub-national analysis in any respect. Any global study involves use of highest-common-denominator information across countries for the sake of comparability. The Monitor is therefore most accurate at the international level and least accurate at sub-national levels. At all levels, however, it is designed to serve as complementary input and as a reference point.

The body of data amassed here could also help establish possible relationships, causal and otherwise, between climate-related phenomena and social and political vulnerabilities, such as propensity to armed violence, instability and migration. This report, for instance, particularly focuses on the relationships between climate-related impacts and transnational flows of

climate change finance and of progress towards the Millennium Development Goals for 2015, the international community’s leading objectives for poverty reduction.

Finally, as the first edition of the Monitor made clear, this report can be improved upon in the future. In spite of its 19th century roots, the science and analysis of climate change is still a relatively new field of study as conventionally defined, and it is evolving rapidly. Several of the indicators in this report rely on information that was not available when the first Monitor was being developed only two years ago. Only a few of the indicators in the report rely on studies published prior to the last major IPCC report in 2007. Its practical shelf-life depends on how quickly this highly active and interdisciplinary field continues to advance.

ITS USERS

The Monitor is specifically prepared to serve as a resource to Climate Vulnerable Forum officials tasked with negotiations and policy development related to climate change. The Monitor has also been used by analysts, policy makers, senior representatives and topic specialists from the following groups:

- Civil society organizations
- Development Aid agencies and intergovernmental and international non-governmental humanitarian and development organizations
- Financial institutions, such as investment banks
- Government climate change, environment, foreign affairs and resources or planning departments
- Heads of state and government
- Journalists, commentators, bloggers

- and the wider media
- Lead climate change negotiators active in the UN talks
- Members or representatives of parliaments in developed and developing countries
- NATO member military intelligence institutions and strategic studies groups
- Research institutions and think tanks with a development, humanitarian or environment focus

APPLICATIONS

The data and perspectives the Monitor provides have been used for a number of applications, including policy development guidance, resource allocation, financial analysis and communication on climate-change issues.

Policy Development

With respect to policy development, the Monitor serves as an additional reference for helping national policy makers and international organizations design and calibrate programmes to respond to climate change. This is particularly valuable in lower-income developing countries, where local decision makers might otherwise not be able to afford a third-party reference to compare with the analysis of other foreign consultants and external experts (Ayers, 2010).

A brief review of National Adaptation Programmes for Action lodged with the UN Framework Convention on Climate Change (UNFCCC) highlights the differences and gaps between countries’ existing policies and the assessment here. Labour Productivity, the most serious climate effect in the Monitor, is barely considered. Cooling of indoor space is also a non-issue in most cases. Perhaps more alarming is recent World Health Organization research highlighting that just 3% of resources for priority projects in Least Developed Countries and small island states target health (WHO, 2010). If these policies had been developed while consulting reference publications like the Monitor, oversights and missed priorities would likely have been more readily avoided. And the impact of national policies addressing climate

change might have been enhanced. Another example is the international humanitarian system. The Climate section on Environmental Disasters estimates that in less than 20 years, climate change could cause thousands of deaths and hundreds of billions of dollars in damage due to a further aggravation of weather (this is after accounting for any anticipated reductions in risk as wealth increases). Is the humanitarian system prepared for such rapid increases in the scale of emergencies? Are more capacities, resources and institutional coordination needed to ensure the international community is prepared? Climate change means the world now operates in a highly variable and dynamically evolving natural environment where the future will constantly be different from the past. International policies of all kinds will have to account for such evolutions in medium- to long-term planning in order to remain effective. Climate change should be taken into account when setting agendas and making policies at the village, regional and global level. And decision makers will need to draw on as many different forward-looking studies, such as the Monitor, as possible.

Climate Finance

Because it compares current and future levels of vulnerability to climate change, the Monitor can help decision makers prioritize where to spend their resources. This not only relates to legal obligations under the UNFCCC that developed countries have assumed to help developing countries. It also relates to countries being able to see the benefits and pitfalls of how they allocate resources across various sectors or strategies. There is however no internationally accepted definition of “vulnerable” countries among intergovernmental agencies such as the UNFCCC. Nor is the Monitor an attempt to establish a fixed definition. The Monitor does, however, provide arguments for why a wide range of countries – particularly developing and least developed, land-locked, or small island developing states – may have very serious climate-related vulnerabilities.

15 billion dollars of climate finance currently flow each year from taxpayers in developed countries to developing countries, including just over 2 billion dollars for support to adapt to climate change impacts. Are those resources being allocated according to who is most vulnerable? Are those resources being prioritized according to the co-benefits they would deliver to the environment or human health? There are almost no comprehensive, up-to-date tools for assessing the near-term effects of climate change and the carbon economy and how they differ from country to country. And yet international actors have to make choices about where to focus energies and resources today – and have been doing so for over a decade now. Despite the imperfections of such tools, including this one, policy makers without this kind of reference are passing equally imperfect or worse judgements on these issues or are allowing political, cultural, strategic or military factors to play a determining role in climate change investment decisions. Some combination of all approaches is most likely. However, adding reference points from independent assessments can enrich the decision-making landscape and support more effective and cost-efficient policy.

Business and Investment

This report estimates the extent to which climate change has already affected the global economy, determining the wealth and growth prospects of different countries. As climate change accelerates and triggers new effects, it could have an even larger impact on a country's economic state. The Monitor provides a range of insights into the risks different countries will face on this front in the near term. Those insights are of interest both for the purpose of analysing a country's overall risk and for developing investment strategies.

Communication

The Monitor is useful to the lay person as a broad introductory work as well as to politicians and advocates across a variety of organizations that can use the data and analysis to question new or prevailing policies, be they government, corporate or otherwise.

FOCUS AND STRUCTURE

Years

2010 and 2030

Countries

184

Assessments

A global examination of wide-ranging negative and positive effects across two separate climate-related themes.

 **Climate:** The impact of climate change on society.

 **Carbon:** The independent impact of the carbon economy on society (separate from climate change).

Vulnerability Levels

An indicator of the level of vulnerability of a country, region or group to a particular climate or carbon stress in relation to levels experienced by other countries.

● Acute ● Severe ● High ● Moderate ● Low
Most vulnerable Least vulnerable

CLIMATE INDICATORS

ENVIRONMENTAL DISASTERS

Drought
Floods & Landslides
Storms
Wildfires

HABITAT CHANGE

Biodiversity
Desertification
Heating and Cooling
Labour Productivity
Permafrost
Sea-Level Rise
Water

HEALTH IMPACT

Diarrheal Infections
Heat & Cold Illnesses
Hunger
Malaria & Vector-Borne
Meningitis

INDUSTRY STRESS

Agriculture
Fisheries
Forestry
Hydro Energy
Tourism
Transport

Impact Areas

 **Environmental Disasters:** Economic and health effects of environmental disasters generated or worsened by human activity.

 **Habitat Change:** Economic effects of shifts and changes to the environment.

 **Health Impact:** Health and economic effects for different diseases grouped by illness or cause.

 **Industry Stress:** Economic effects experienced by specific sectors of the economy.

CARBON INDICATORS

ENVIRONMENTAL DISASTERS

Oil Sands
Oil Spills

HABITAT CHANGE

Biodiversity
Corrosion
Water

HEALTH IMPACT

Air Pollution
Indoor Smoke
Occupational Hazards
Skin Cancer

INDUSTRY STRESS

Agriculture
Fisheries
Forestry

KEY CONCEPTS AND DEFINITIONS

CLIMATE

Climate is taken to mean the average weather. The classical time period used by the World Meteorological Organization to determine the climate is 30 years. So the climate is the average weather over a given period of 30 years. Parameters such as temperature, rainfall and wind can be examined to determine key characteristics of the state of the climate at different periods in time, and to identify variation across time periods. The section of the Monitor labelled "Climate" is concerned with the socio-economic effects of a changing climate.

CLIMATE CHANGE

Climate change is a change in average weather. For the purpose of this study, it is assumed that human activities are the principal and overwhelming – if not exclusive – cause of the contemporary warming of the climate, in accordance with the broad consensus and more recent evidence on this subject (IPCC, 2007; Rohde et al., 2012; Muller, 2012).

According to the United Nations Framework Convention on Climate Change (UNFCCC), climate change occurs "in addition to natural climate variability observed over comparable time periods" (UNFCCC, 1992). The Monitor controls for natural variability in a number of ways, including by judging all impacts against a 1975 baseline period (i.e. the change in temperature and other variables versus the 1975 climate), even though considerable warming of the climate system had occurred well prior to 1975. Therefore the Monitor's assessment of climate change should be understood to align with that of the UNFCCC.

Climate change is caused by alterations to the composition of the Earth's atmosphere, in particular, through emissions of GHGs such as CO₂, and through changes to the land, such as through deforestation and land conversions. The process

is additionally tempered by a range of positive or negative environmental feedbacks, for instance the extent of heat-reflective sea ice in the Arctic. Climate change has as its consequences a wide variety of environmental, social and economic effects, many of which are the subject of this report. These consequences are the exclusive focus of the first part of the Monitor's assessment, labelled "Climate".

CLIMATE VULNERABILITY

Climate vulnerability, or vulnerability to climate change, is taken to mean the degree to which a community experiences harm as a result of a change in climate. These communities may be regional, sub-regional, national, sub-national, or other. Vulnerability encapsulates socio-economic concerns, such as income levels, access to information, education, social safety nets and other meaningful determinants of the resilience of a given community. It also encapsulates environmental or so-called "bio-physical" factors, such as geographic location, topography, natural resource supplies, vegetation and otherwise. A community's vulnerability in all these respects may be determined intrinsically, for example, through a local government's aversion to corruption, or exogenous factors, such as globalized markets.

The definition of "vulnerability" used here aligns closely with the IPCC definition, termed "outcome vulnerability" – higher levels of harm are the outcome in large part of higher levels of vulnerability, and vice versa, impacts are lower where vulnerability is lower (IPCC, 2007; Füssel, 2009). The Monitor's concept of vulnerability, therefore, is a composite of exposure and vulnerability and may also be referred to as "risk" (Peduzzi et al., 2012a).

CARBON

Carbon dioxide (CO₂) is a principal greenhouse gas along with numerous other "heat-trapping" pollutants, such as methane, black carbon or nitrous oxide. Like these other pollutants, CO₂ is typically generated as a by-product of combustion when carbon-based fuels – e.g. coal, oil, charcoal/wood, natural gas – are burned. So the terms "carbon" and "carbon economy" have come to embody the problem at the root of the climate challenge and are used here as a blanket name for all greenhouse pollutants that are related to human activity and can cause climate change, or detract from resolving it. Not covered under the rubric of "Carbon" is the full breadth of socio-economic impacts related to the industrial economy. Toxic factory refuse, industrial solvent disposal and waste, or agricultural pesticides and other such issues are deliberately not considered here. The Monitor also assumes that any societal or environmental costs of a low-carbon economy, i.e. externalities of renewable or low-emissions energy solutions, are negligible with respect to this framework of analysis, since carbon intensive energy modes generate 10 to 100+ times greater negative externalities for the environment and society than low-carbon alternatives (IPCC, 2012b).

ADAPTATION

Adaptation is understood as actions that help communities or their ecosystems cope with a changing climate, in particular, steps that reduce any losses or harm inflicted. The IPCC defines adaptation as an adjustment in natural or human systems to reduce the harm or exploit the benefits of actual or expected climatic stimuli or their effects. Although there is variation from indicator to indicator, the Monitor does assume communities have a baseline capacity to adapt and that a degree of forced adaptation is already occurring. This is seen in

various socio-economic datasets that underlie certain indicators. So, for instance, the level of mortality risk for Bangladesh estimated by the UN reflects the current sum of exposure and vulnerability there, including any efforts that have been made to adapt to a changing climate. The Climate Water indicator is another example, where the line between impact and adaptation blurs since the assumption is that the next cheapest option will be chosen to replace lost water resources at cost and according to demand, so the value of water lost or gained is its market value. In addition, the Monitor has made various dynamic adjustments, such as adjusting a community's vulnerability measure due to its economic growth prospects. For Climate and Carbon health indicators, for instance, there is strong evidence that many diseases decline as countries gain in wealth, so that is accounted for in the Monitor (Mathers and Loncar, 2005).

MITIGATION

Mitigation is broadly understood as action that stems global warming, i.e. that mitigates the warming effect. The IPCC defines mitigation as human intervention to reduce the sources or enhance the sinks of greenhouse gases. Mitigation policies could be programmed to minimize the negative (and positive) impacts measured in the Carbon part of the Monitor. In the scenarios and indicators of the Climate and Causes section, the Monitor has factored in carbon use or emissions according to reference scenarios – the IPCC's mid to high A1B scenario is the most common assumption used (IPCC SRES, 2000).

USING THE MONITOR

The Monitor is divided into three main parts: first, a region-by-region, then country-by-country overview of the assessment for all 184 countries included in the analysis; then the two key sections, Climate and Carbon.

These detailed sections provide data and an explanation for each indicator and detail the principal causes and effects for each instance.

The Monitor's second edition is not directly comparable with the 2010 Monitor because updates to the methodology, including a significant expansion in the breadth of analysis, make the new edition substantially more comprehensive than the original.

The country studies follow the Climate section, as their focus relates primarily to the Monitor's Climate assessment. And the report provides an analysis of the interrelationships between Climate and Carbon as a bridge between the two sections. The reader will find country-level information for each of the report's 34 indicators. The data tables and the upper map of each indicator group countries by their level of vulnerability. The level given, which is for 2030, assumes that no deliberately scaled-up attempts will be made to reduce risks. The climate change impact in 2030 is understood to be largely committed because the oceans have absorbed a certain amount of heat that they will release back into the atmosphere, ensuring continued warming for decades to come (Hansen et al., 2005). Figures in absolute terms are given either in mortality or US dollars (2010 PPP) or both. Other metrics are provided for some of the indicators where appropriate and feasible.

The values given represent this research project's best estimates of possible country-level outcomes. Larger countries invariably have larger impacts when measured in absolute terms, but the level of vulnerability registered identifies the intensity of the effects relative to size. The figures are basically averages and, despite the impression of precision

they convey, it's important to note that it is nearly impossible to achieve any real precision. All figures should be considered plausible but simply a broad indication of the level of impact that could be expected.

CONFIDENCE

It is also important to note, when reviewing information at the indicator level, that each indicator has been assigned a level of "Confidence" and, in the case of the Climate section, "Regional Climate Uncertainty". Confidence is noted as "Robust" (highest confidence), "Indicative", or "Speculative" (least confidence). That evaluation is based on judgements that are explained in this book's Navigator and in more detail in the Monitor's methodological annex at: <www.daraint.org/cvm2/method>.

Localized Uncertainties

Climate outcomes are deemed more certain for some regions than for others. Therefore, the Climate section includes maps of regional climate uncertainty (lower map). These indicate the level of disagreement among leading climate models by region on whether there will be increases or decreases in the main driving climate variables, such as rainfall or temperature. When uncertainty is "Limited", it denotes for instance that less than 10% of models disagree for that region on an increase or decrease. When it is "Considerable", more than one third of models disagree. This information is particularly relevant for indicators based on highly uncertain climate parameters, such as rainfall. A lot more rain or a lot less would make a significant difference for any response to climate change, and different models sometimes show little agreement on such key points (Tebaldi et al., 2011). Uncertainty related to the degree of change is not represented in these maps but is one of the factors accounted for in the Confidence evaluation. The Monitor's assessment

is based on the average point of models whenever a group of these was available. An exception is the model drawn on for the Storms indicator, specifically for tropical cyclones. The models available gave such completely opposing outputs that a mean was uninformative.

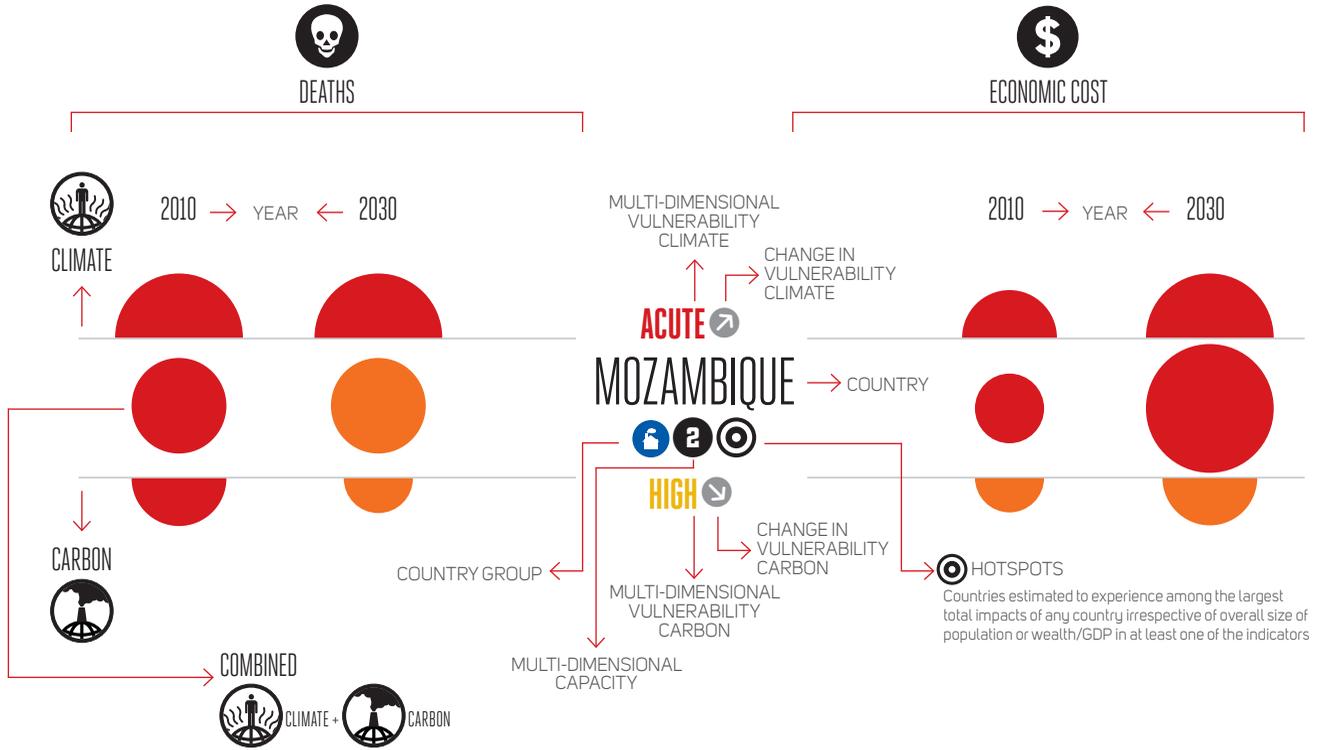
The model most aligned with observational evidence was chosen instead (Mendelsohn et al., 2012; IPCC, 2007). This disagreement is captured in regional uncertainty maps, where most key areas of the globe affected by tropical cyclones (although not North America) carry "Considerable" uncertainty. The Storms indicator is labelled "Speculative" in part due to discord on the scale of changes predicted by different models.

COUNTRY-LEVEL INTERPRETATION

When consulting the Monitor at the country level, readers are encouraged to take advantage of these multi-point considerations. If an indicator is "Speculative" and the country of interest is within a region with "Considerable" uncertainty on the direction of change, the assessment provided in the Monitor should be treated with much more caution than if the inverse confidence and uncertainty values had been given. However, just because models disagree does not mean that the values provided could not be potential future outcomes. Responses to the impacts of climate change should ideally be robust to a range of different outcomes (Dessai et al., 2009). Therefore, planning should be capable of coping with at least the level of impact suggested here. Countries with negative or very low impacts projected for low confidence, high uncertainty indicators like Storms should also respond with caution. The model chosen for Storms predicts a decrease of cyclone activity in the Pacific basin, the likelihood of which has been confirmed by other studies,

although there is no consensus on any clear trend (Mendelsohn et al., 2012; Callaghan and Power, 2010; IPCC, 2012a). Given the levels of uncertainty and lack of agreement among experts, it is likely wiser to take more precautions than the Monitor indicates as necessary.

KEY TO THE MONITOR



VULNERABILITY

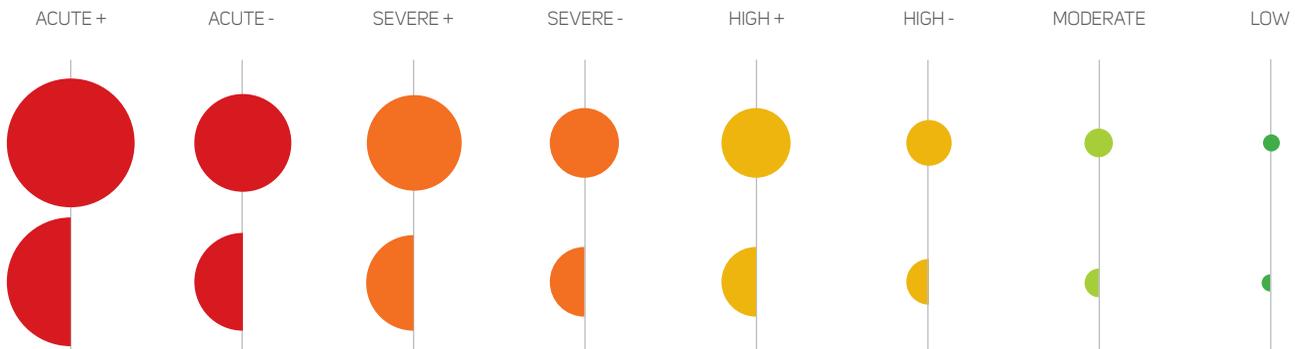
- ↗ INCREASING
- STABLE
- ↘ DECREASING
- ACUTE
- SEVERE
- HIGH
- MODERATE
- LOW

COUNTRY GROUPS

- DEVELOPED
- OTHER INDUSTRIALIZED
- DEVELOPING COUNTRY HIGH EMITTERS
- DEVELOPING COUNTRY LOW EMITTERS

MULTI-DIMENSIONAL CAPACITY

- 4 EXTENSIVE
- 3 INTERMEDIARY
- 2 RESTRICTED
- 1 HIGHLY RESTRICTED



AFRICA

2010

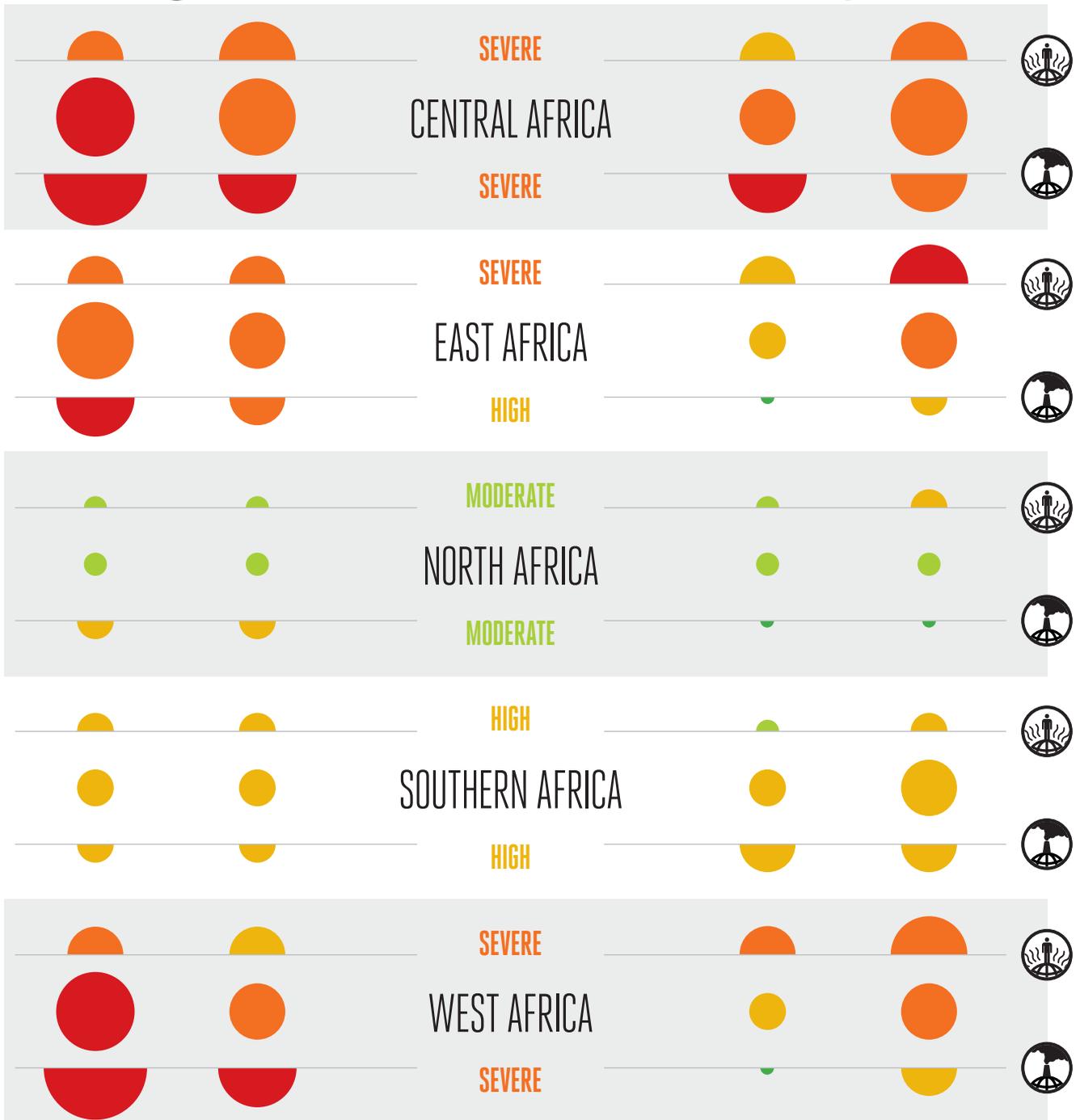


2030

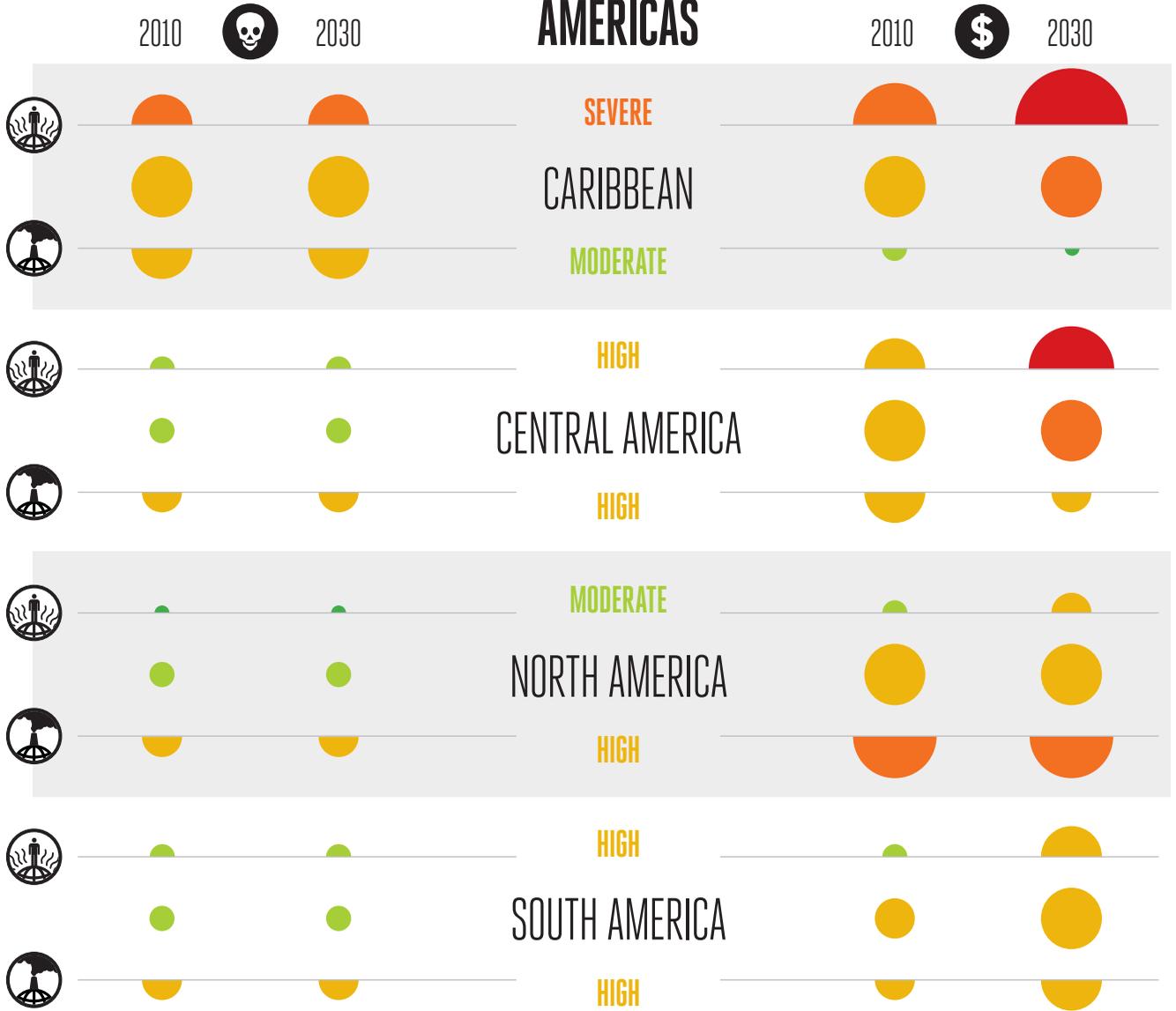
2010



2030



AMERICAS



ASIA-PACIFIC

2010

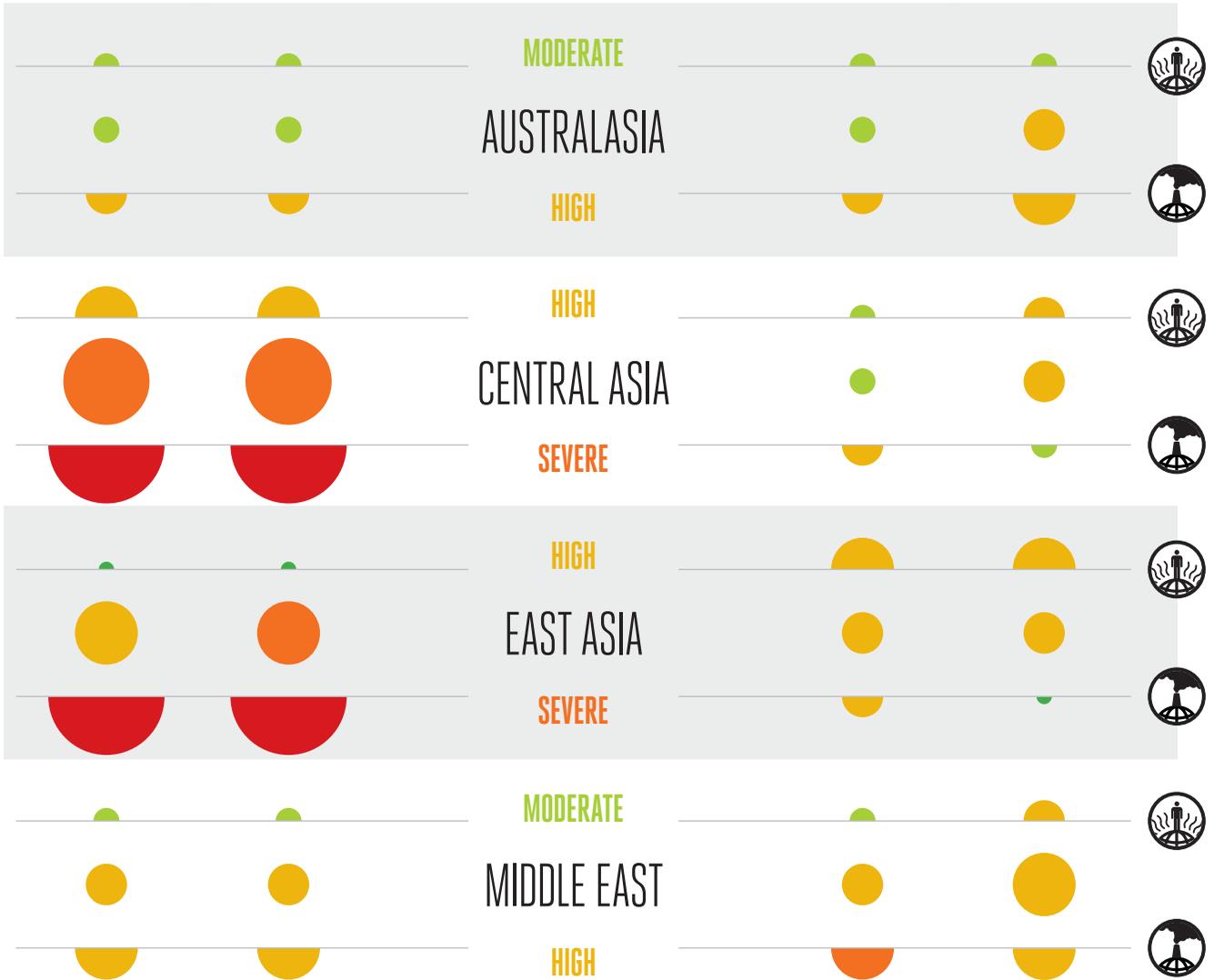


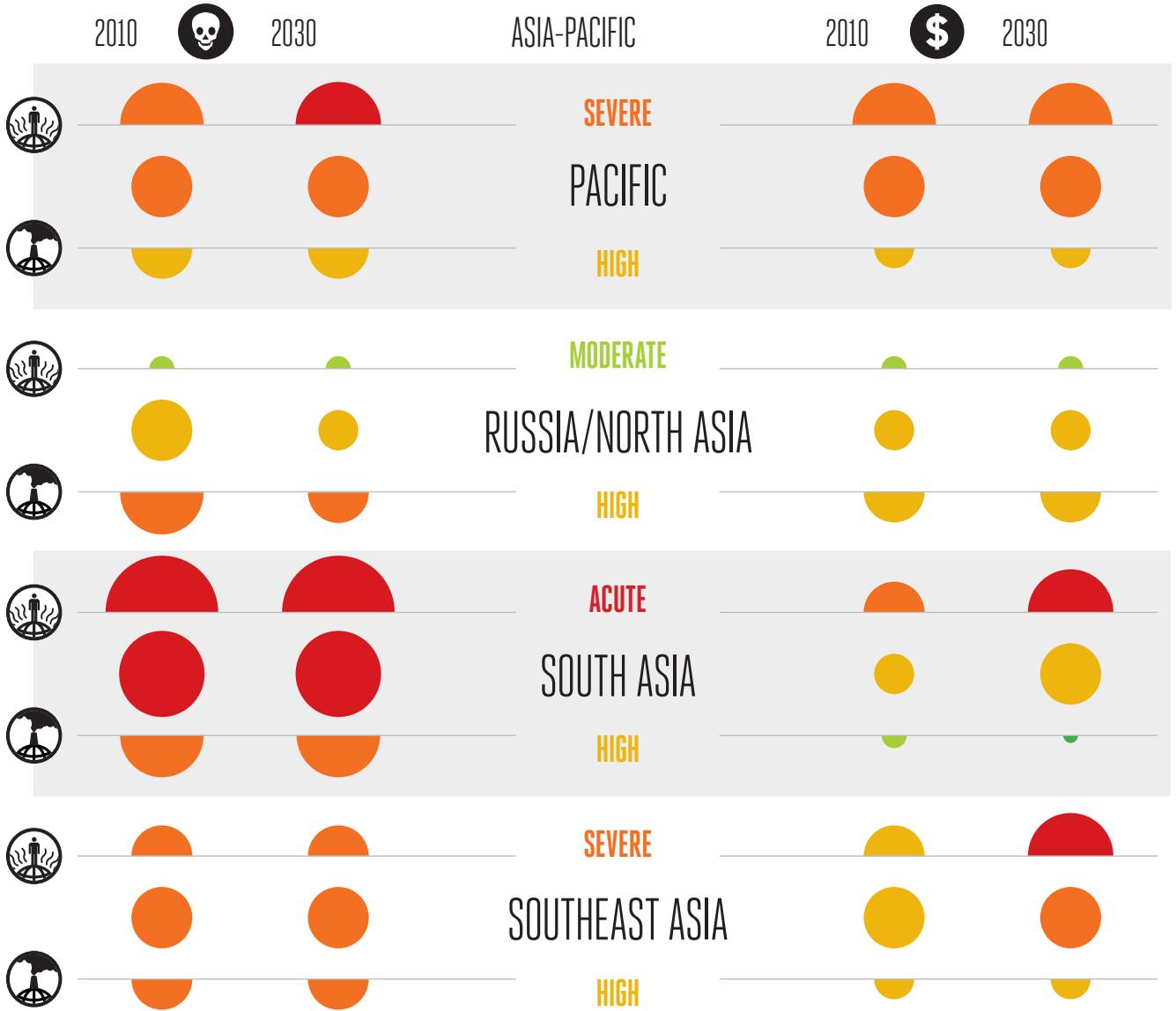
2030

2010



2030





EUROPE

2010

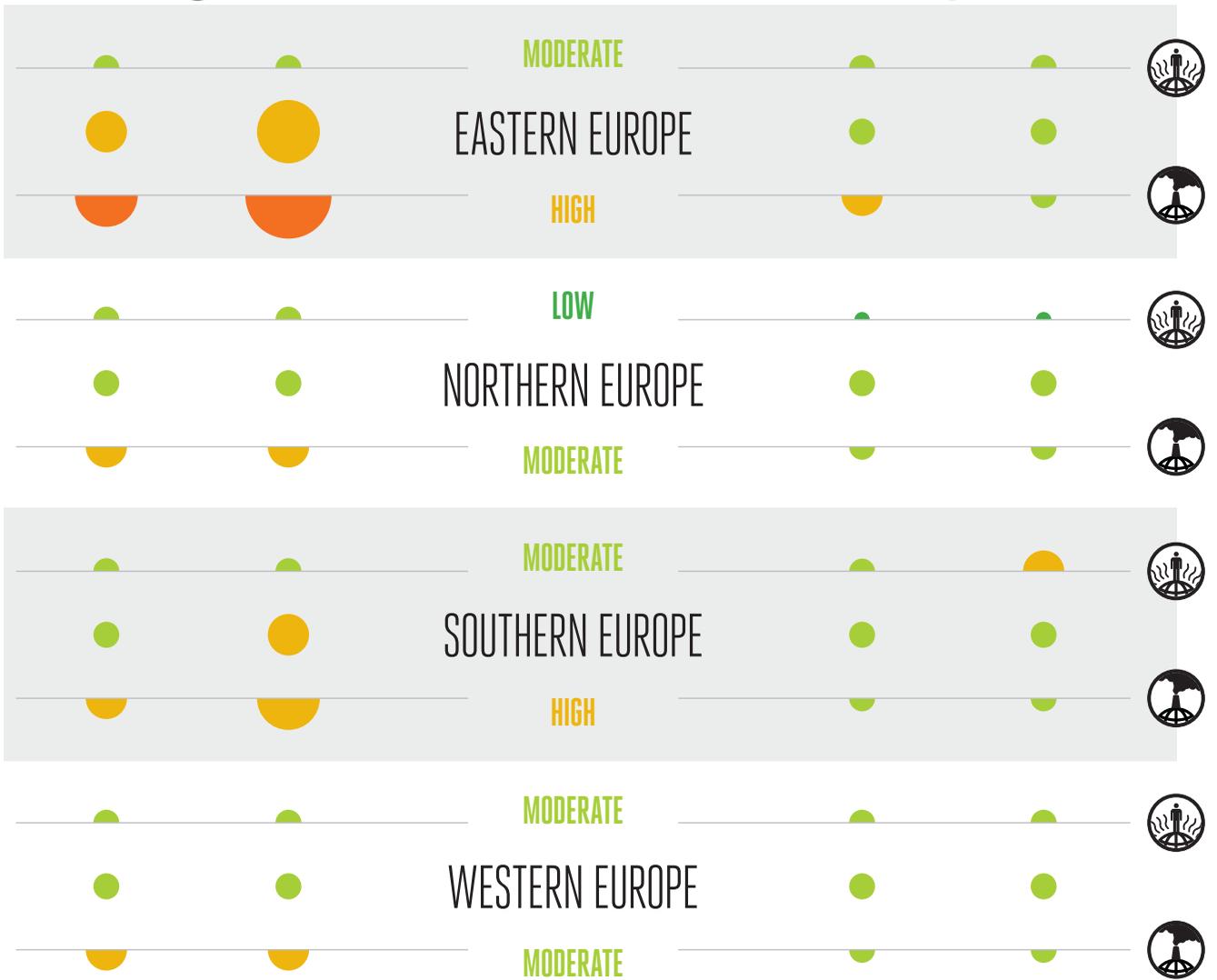


2030

2010



2030



AFRICA

2010



2030

2010



2030



MODERATE →

ALGERIA



LOW →



ACUTE →

ANGOLA



ACUTE →



ACUTE →

BENIN



MODERATE ↓



MODERATE →

BOTSWANA



ACUTE →



ACUTE →

BURKINA FASO



MODERATE ↓



ACUTE →

BURUNDI



MODERATE ↓



2010



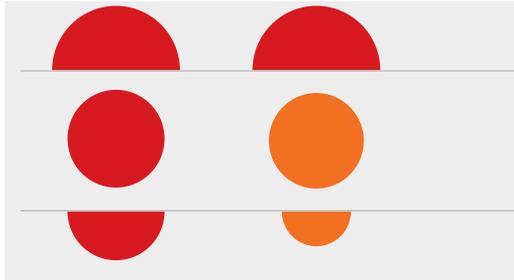
2030

AFRICA

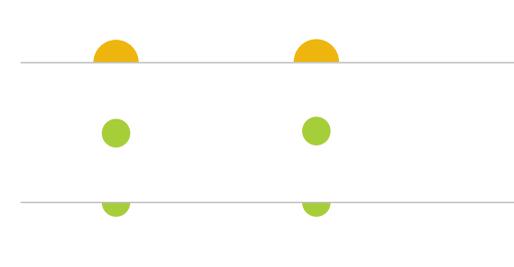
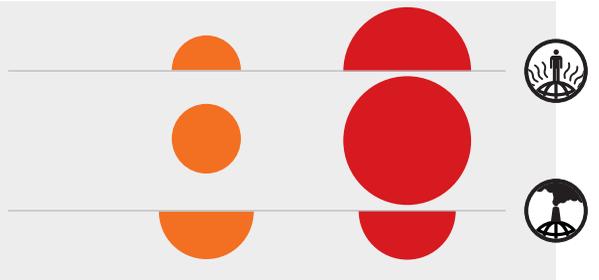
2010



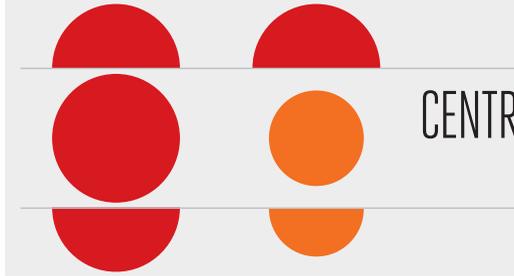
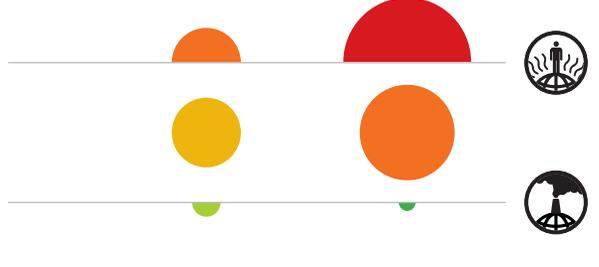
2030



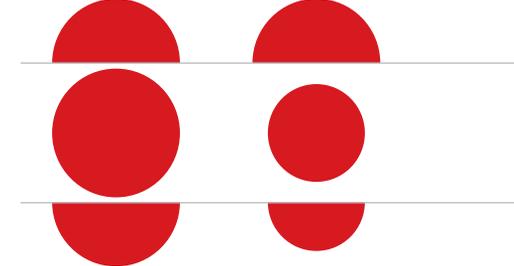
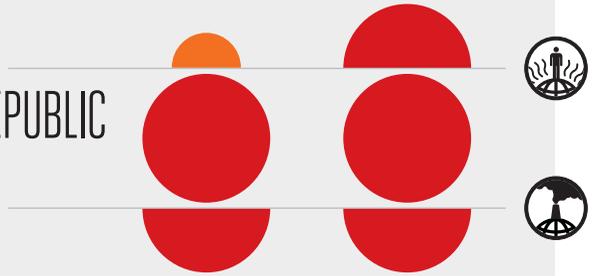
ACUTE ↗
CAMEROON
2
HIGH ↘



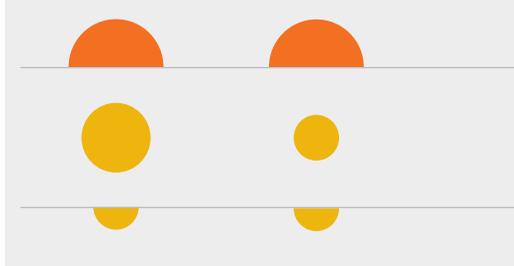
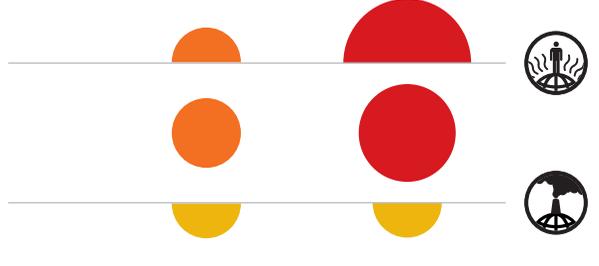
SEVERE ↗
CAPE VERDE
3
LOW ↘



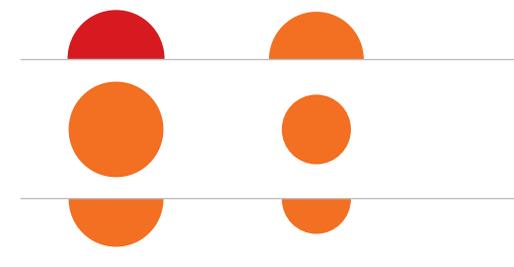
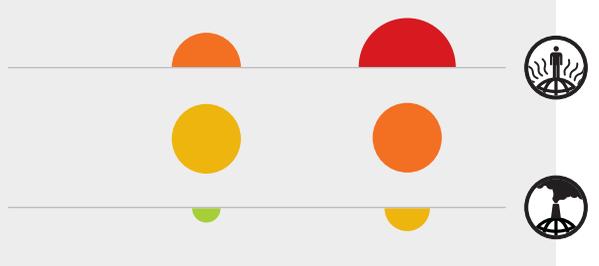
ACUTE ↗
CENTRAL AFRICAN REPUBLIC
1
SEVERE ↘



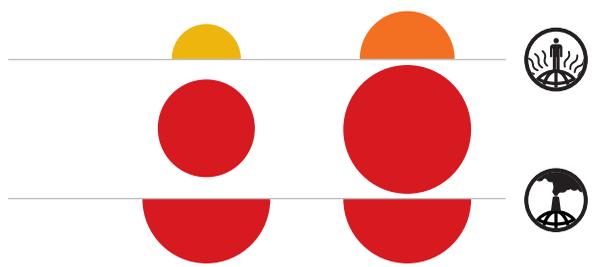
ACUTE ↗
CHAD
1
HIGH ↘

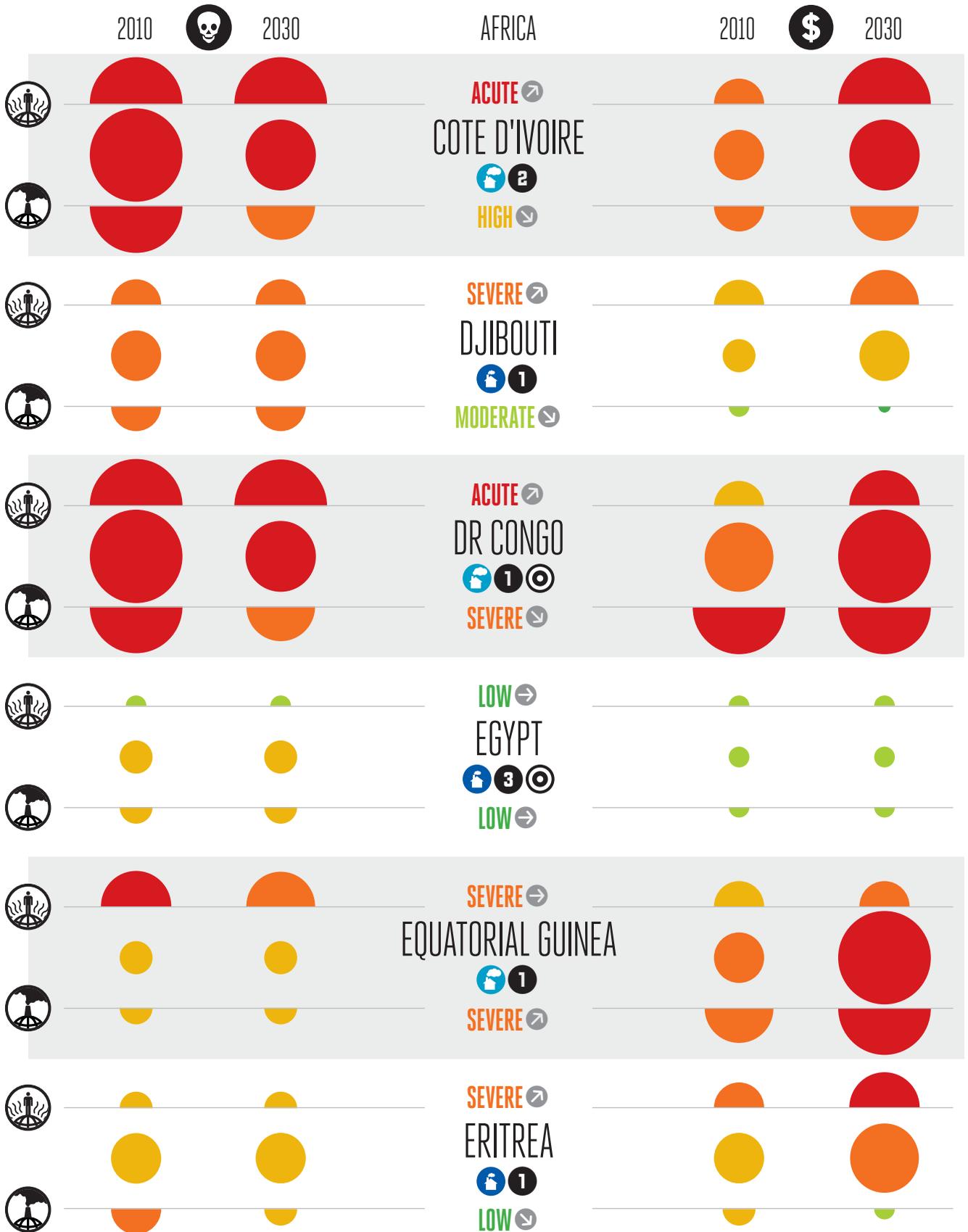


ACUTE ↗
COMOROS
1
MODERATE ↗



SEVERE ↗
CONGO
1
ACUTE ↘





2010



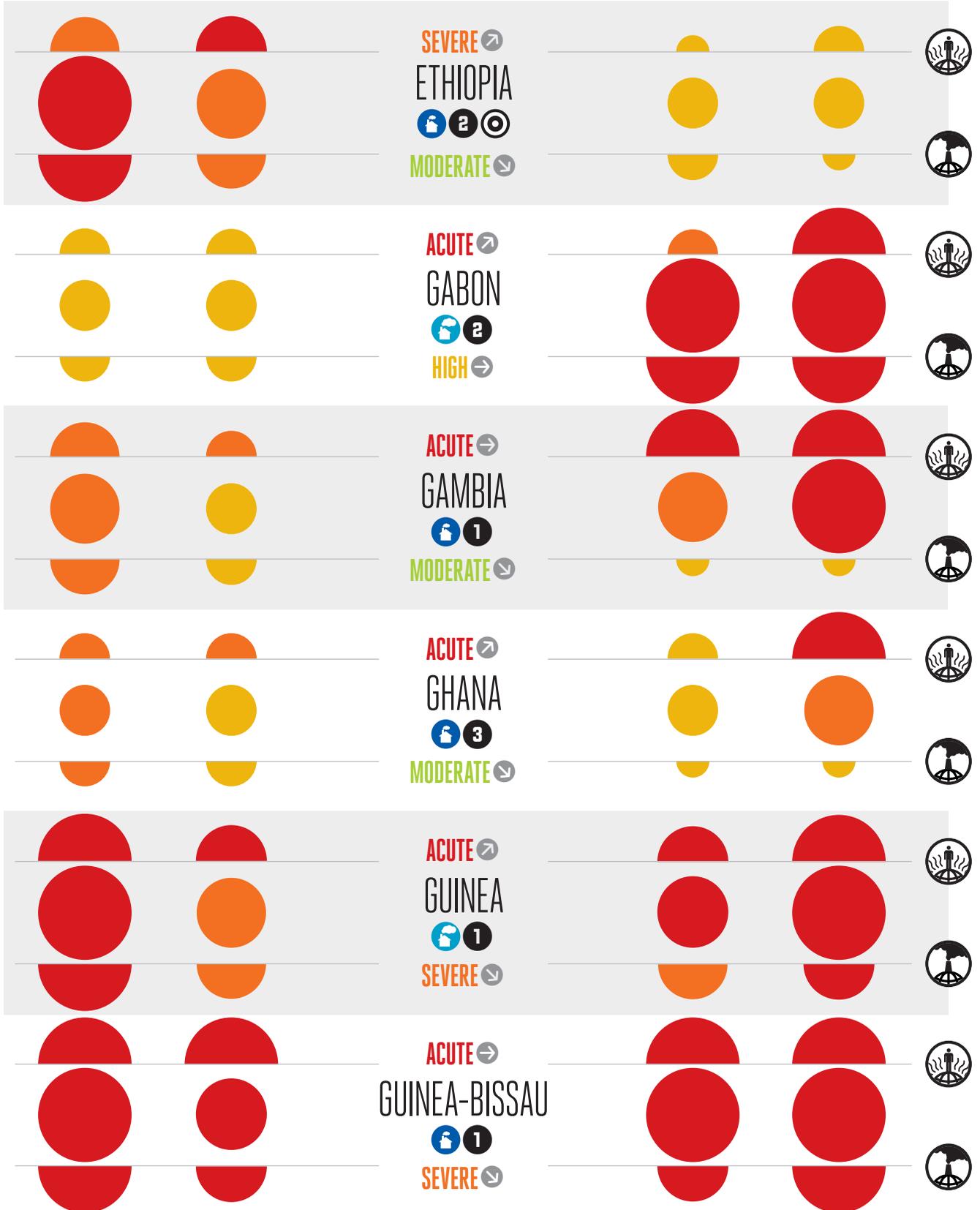
2030

AFRICA

2010



2030



2010



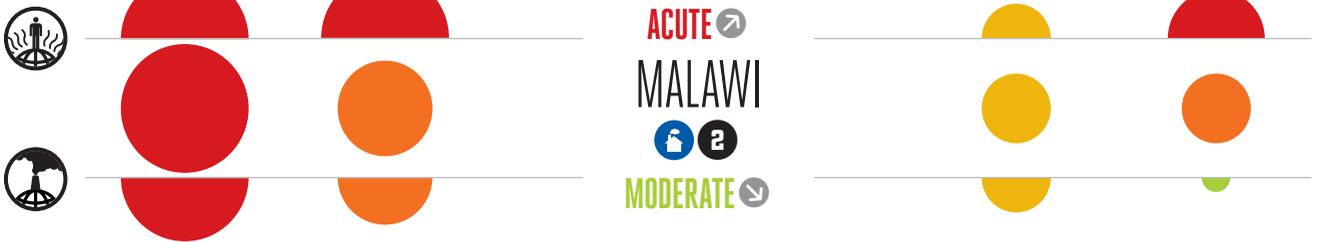
2030

AFRICA

2010



2030



2010



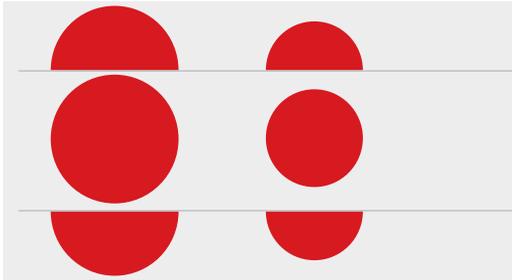
2030

AFRICA

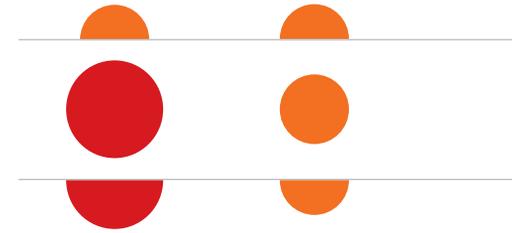
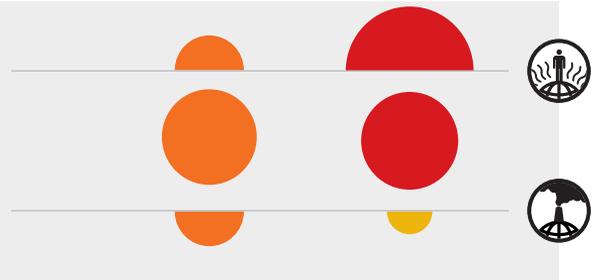
2010



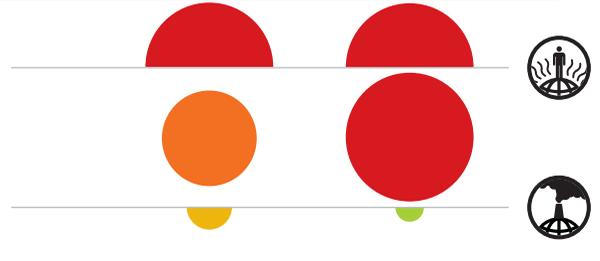
2030



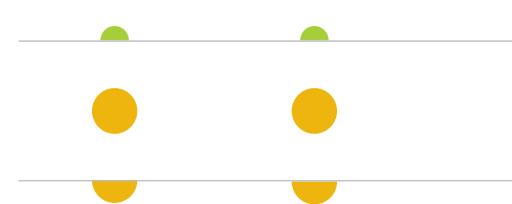
ACUTE ↗
MALI
1
MODERATE ↘



ACUTE ↗
MAURITANIA
1
MODERATE ↘



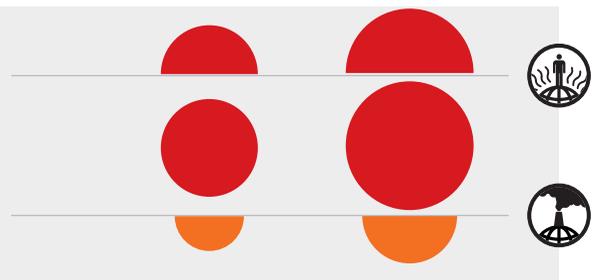
SEVERE ↗
MAURITIUS
3
LOW →



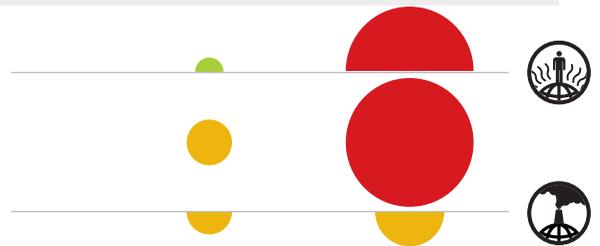
HIGH ↗
MOROCCO
4
LOW →

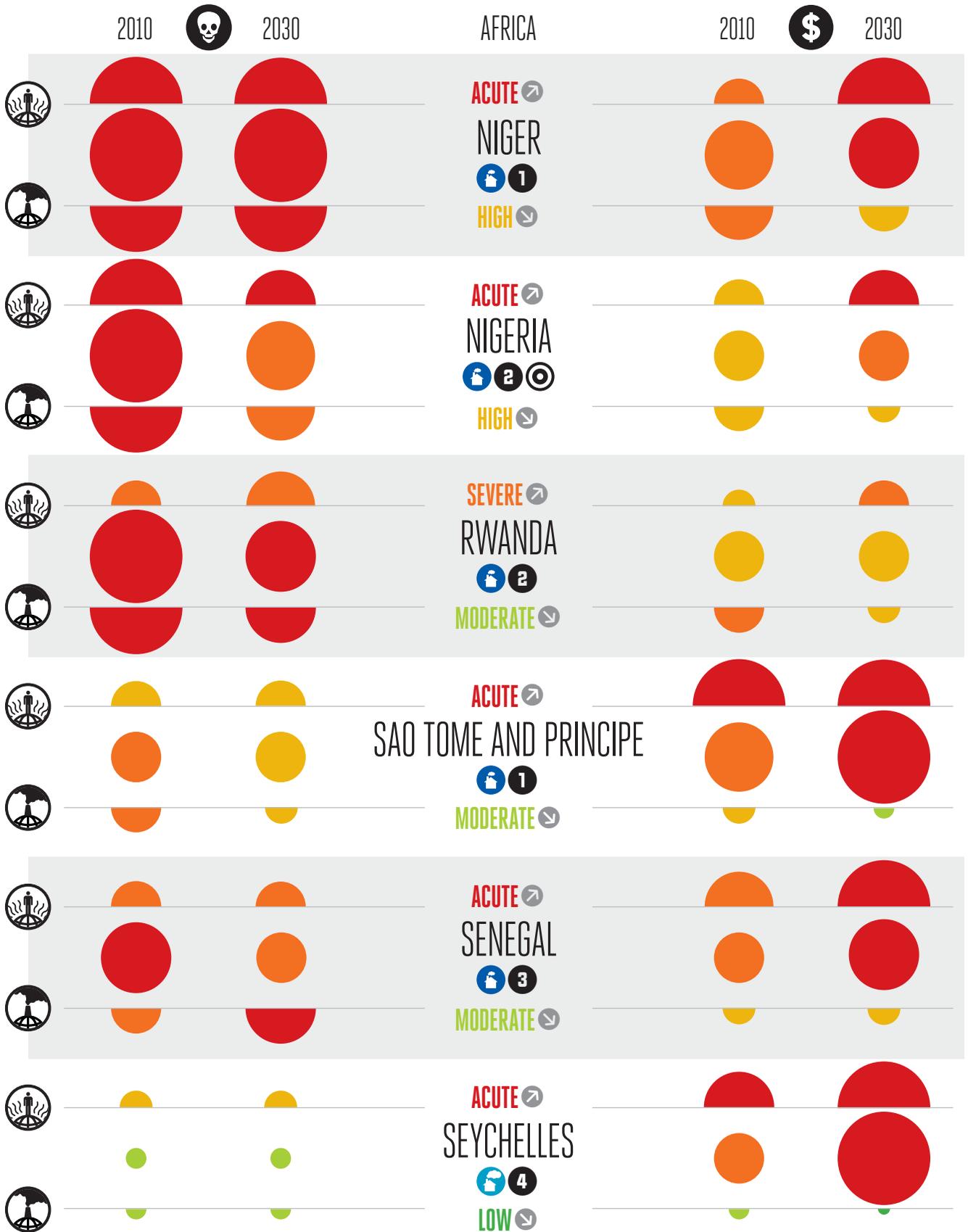


ACUTE ↗
MOZAMBIQUE
2
HIGH ↘



SEVERE ↗
NAMIBIA
3
MODERATE ↗





2010



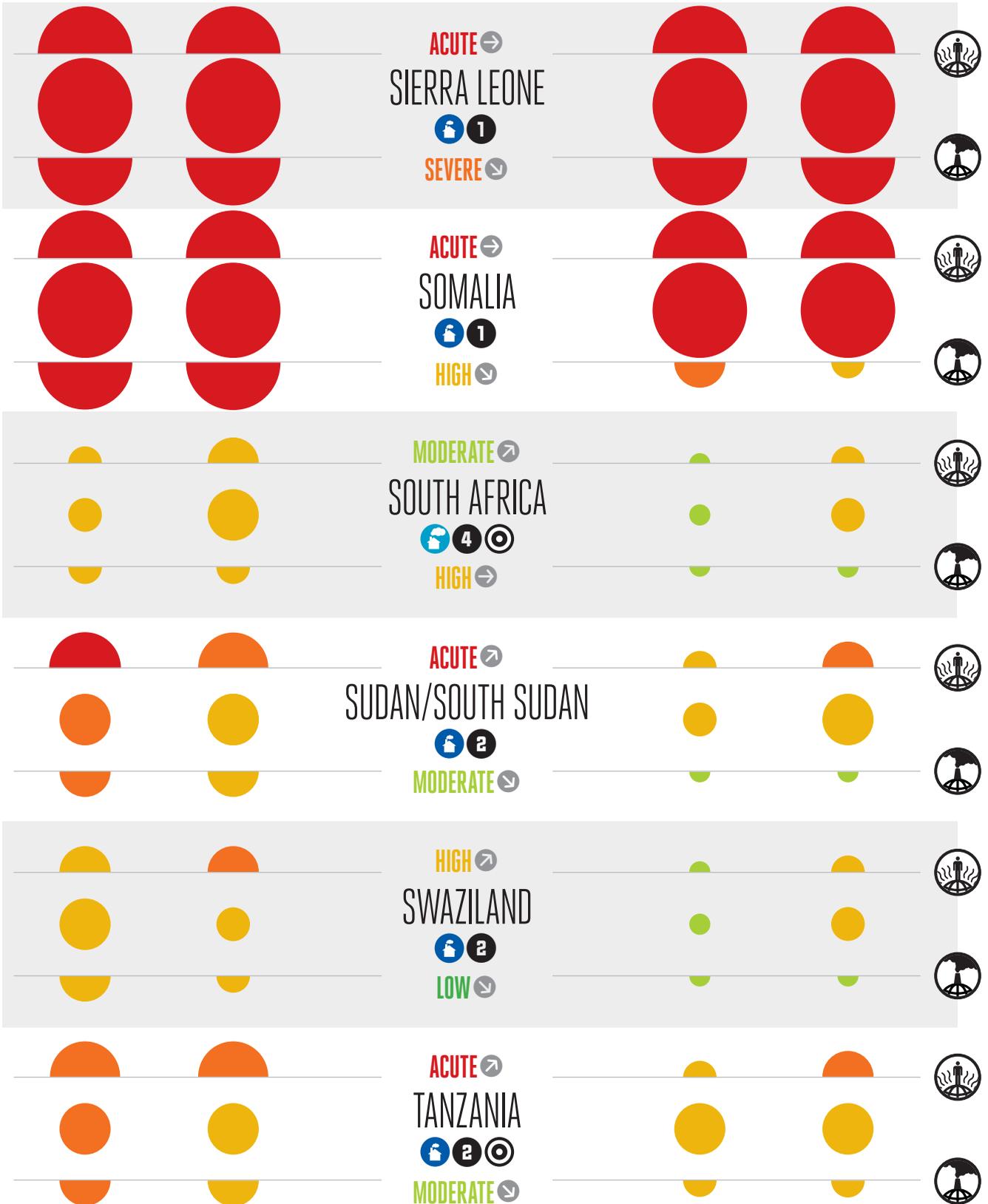
2030

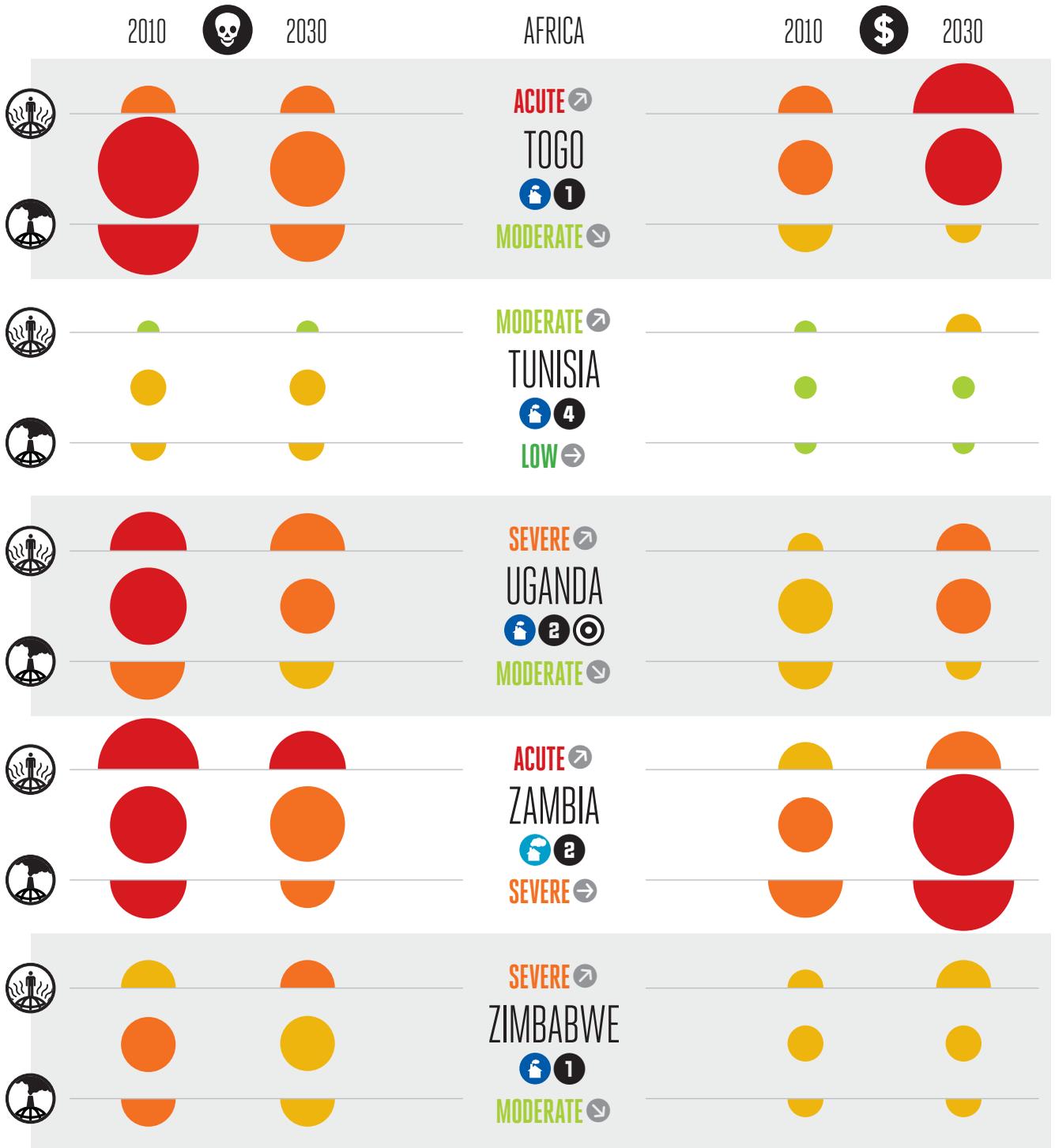
AFRICA

2010



2030





2010



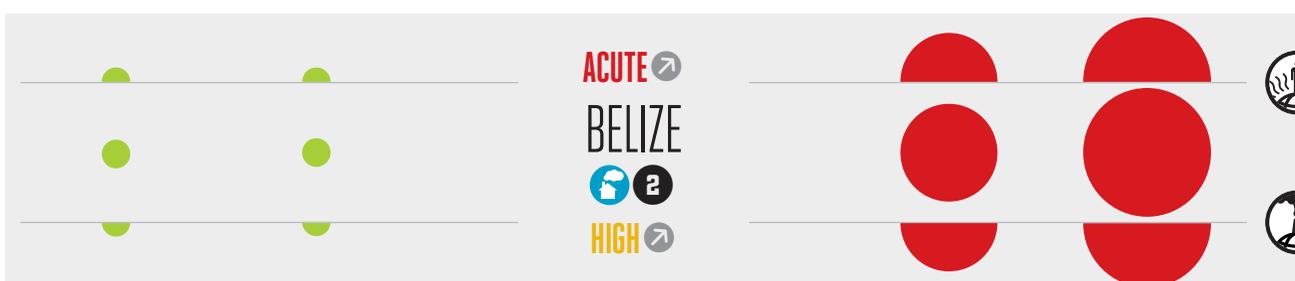
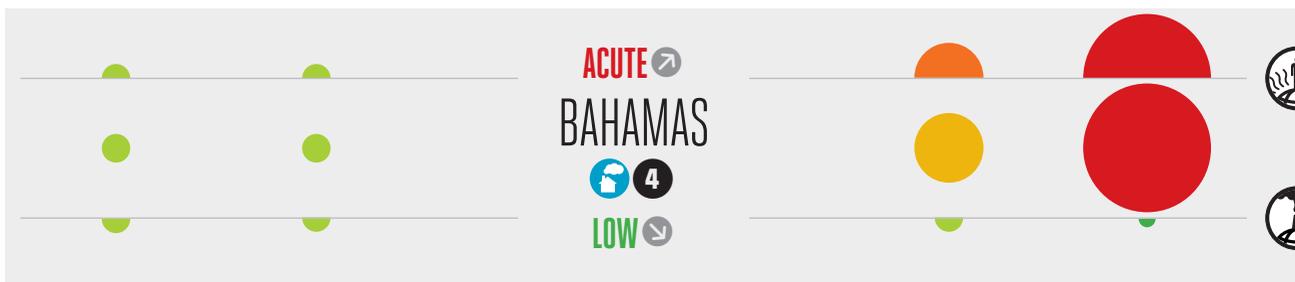
2030

AMERICAS

2010



2030



2010



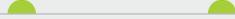
2030

AMERICAS

2010

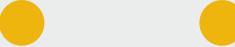


2030

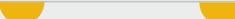


MODERATE →

BRAZIL



HIGH ↗

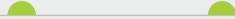


LOW →

CANADA



ACUTE ↗

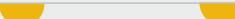
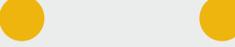


MODERATE ↗

CHILE



MODERATE ↗

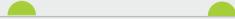


MODERATE ↗

COLOMBIA



HIGH ↗

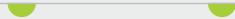
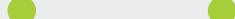


HIGH ↗

COSTA RICA



LOW →

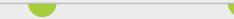
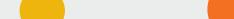
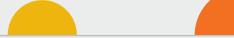
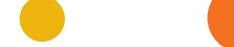
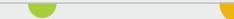
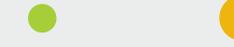
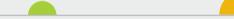
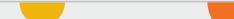
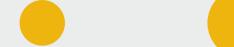
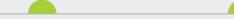


SEVERE ↗

CUBA



MODERATE →



2010



2030

AMERICAS

2010



2030

ACUTE ↗
DOMINICA
3
LOW ↘

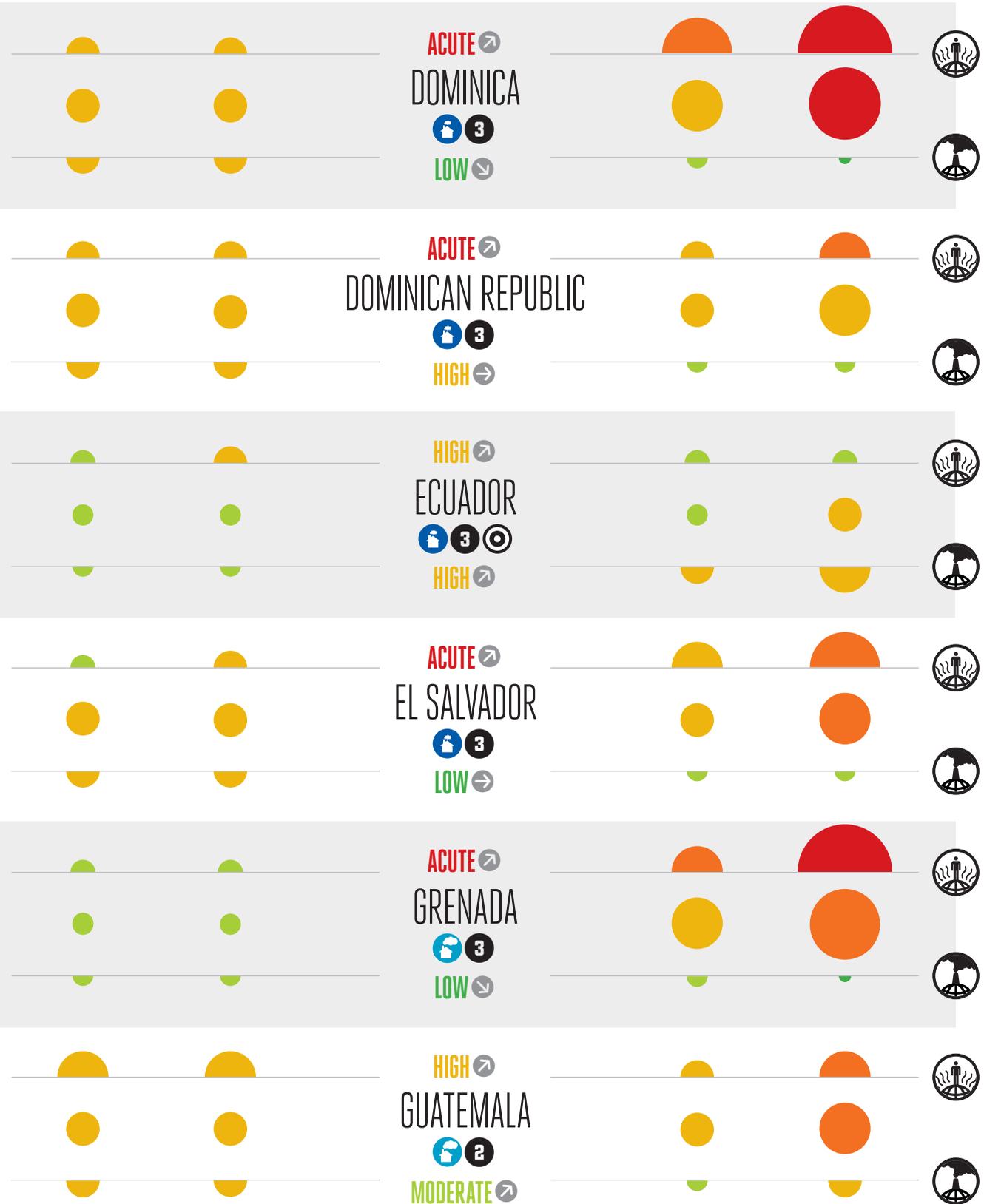
ACUTE ↗
DOMINICAN REPUBLIC
3
HIGH →

HIGH ↗
ECUADOR
3
HIGH ↗

ACUTE ↗
EL SALVADOR
3
LOW →

ACUTE ↗
GRENADA
3
LOW ↘

HIGH ↗
GUATEMALA
2
MODERATE ↗



2010



2030

AMERICAS

2010



2030



ACUTE ↗



GUYANA



ACUTE ↗



ACUTE ↗



HAITI



MODERATE ↘



ACUTE ↗



HONDURAS



MODERATE ↗



ACUTE ↗



JAMAICA



MODERATE ↘



HIGH ↗



MEXICO



MODERATE ↗



ACUTE ↗



NICARAGUA



HIGH ↗



2010



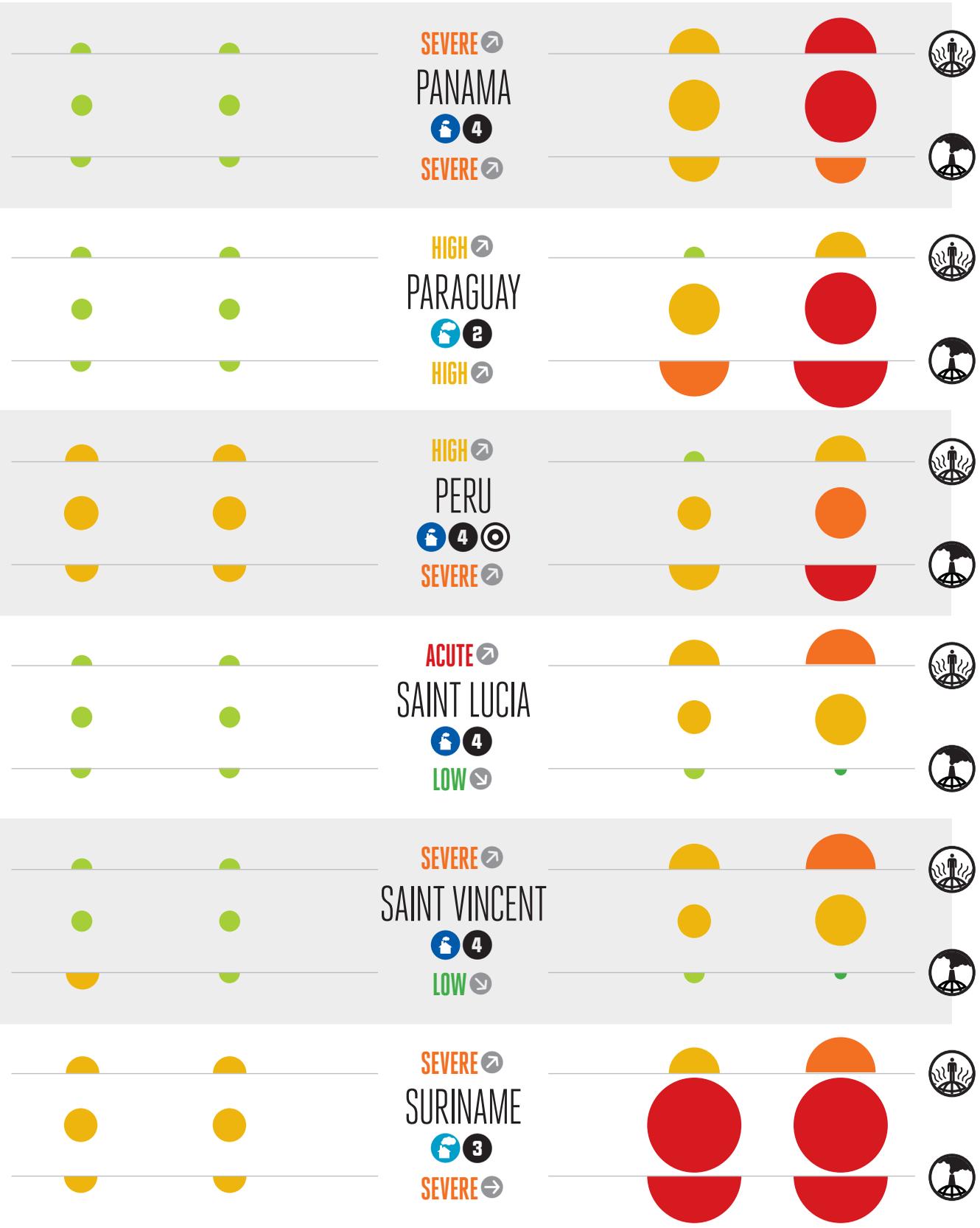
2030

AMERICAS

2010



2030



SEVERE ↗

PANAMA

4

SEVERE ↗

HIGH ↗

PARAGUAY

2

HIGH ↗

HIGH ↗

PERU

4

SEVERE ↗

ACUTE ↗

SAINT LUCIA

4

LOW ↘

SEVERE ↗

SAINT VINCENT

4

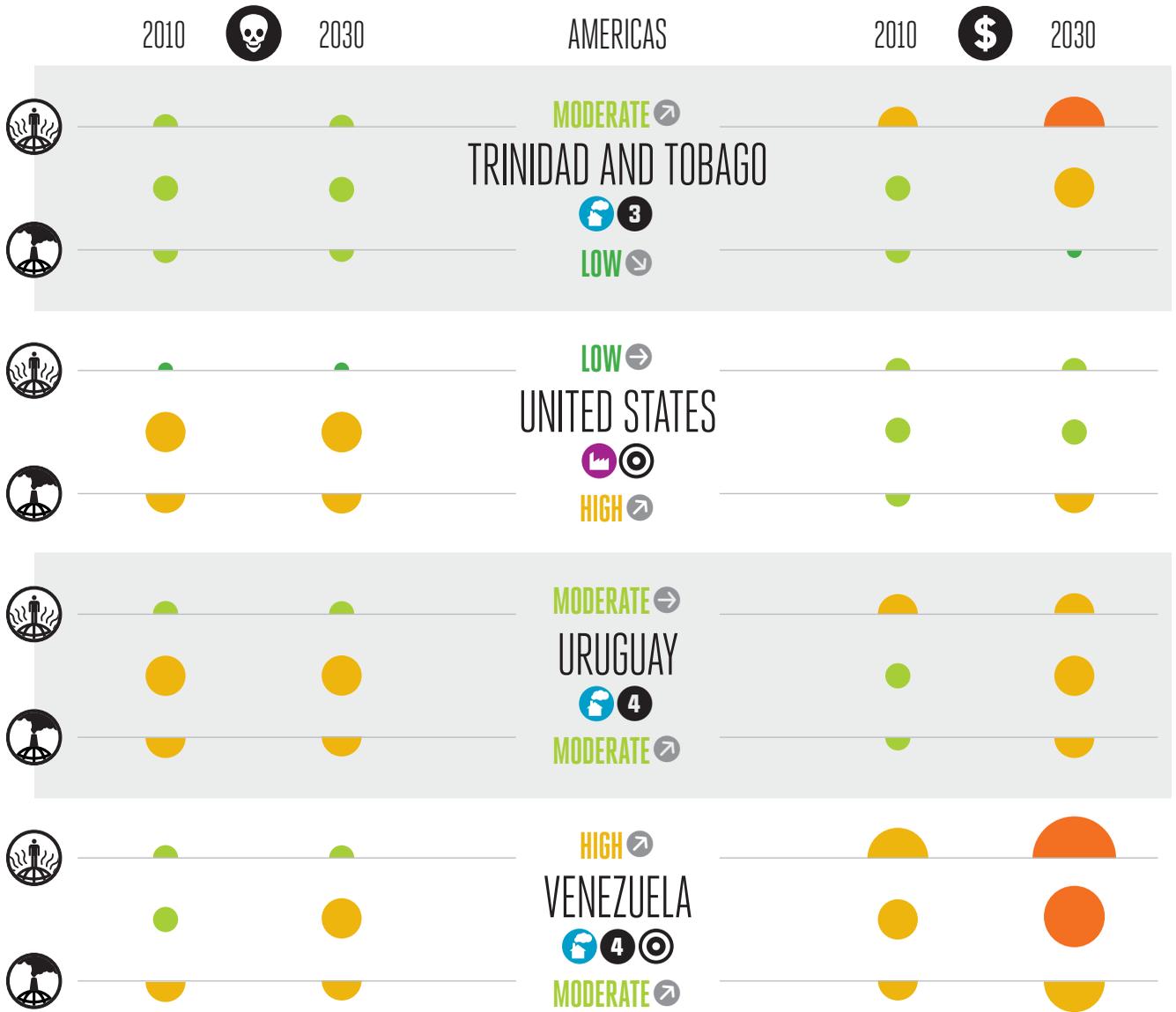
LOW ↘

SEVERE ↗

SURINAME

3

SEVERE ↗



2010



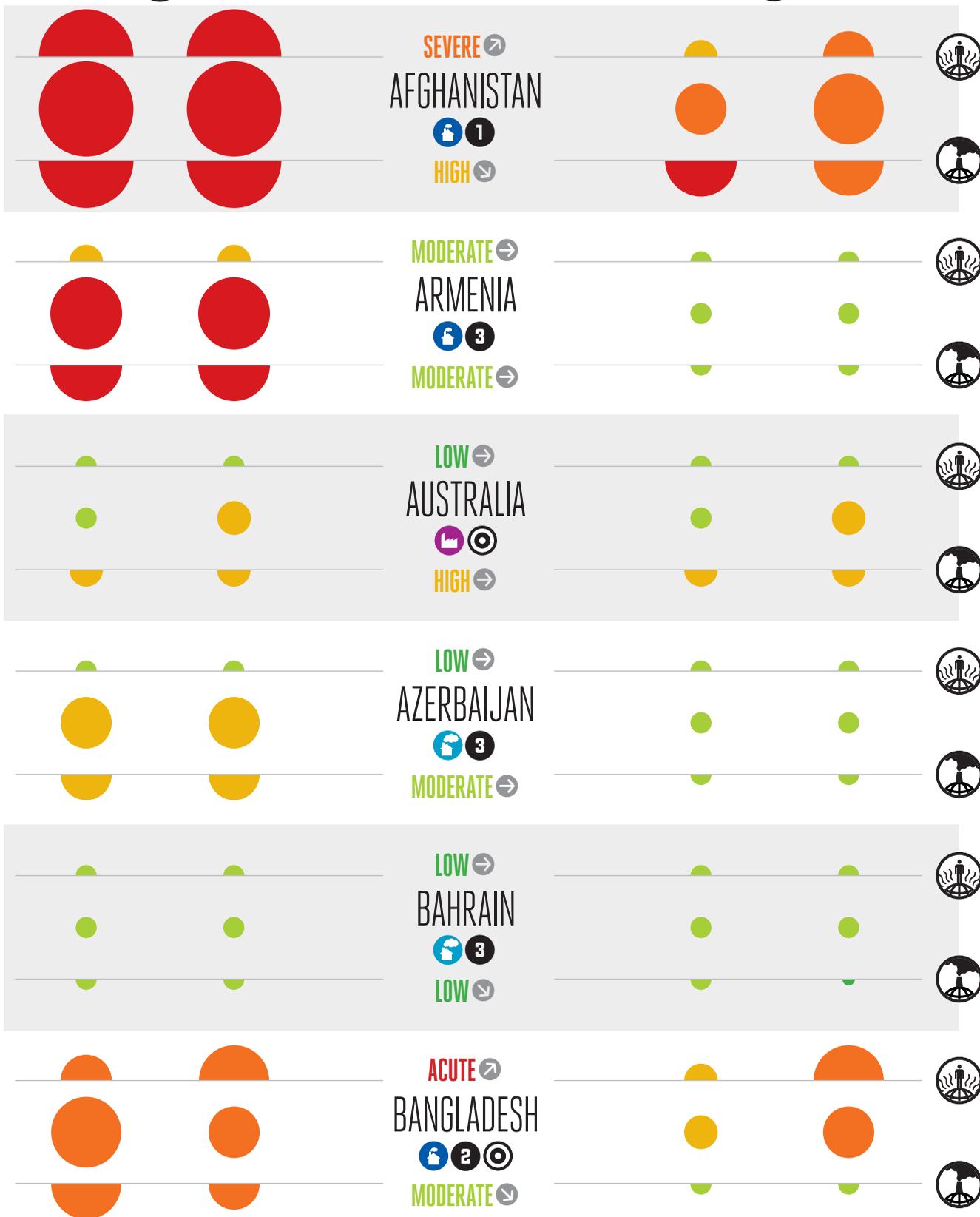
2030

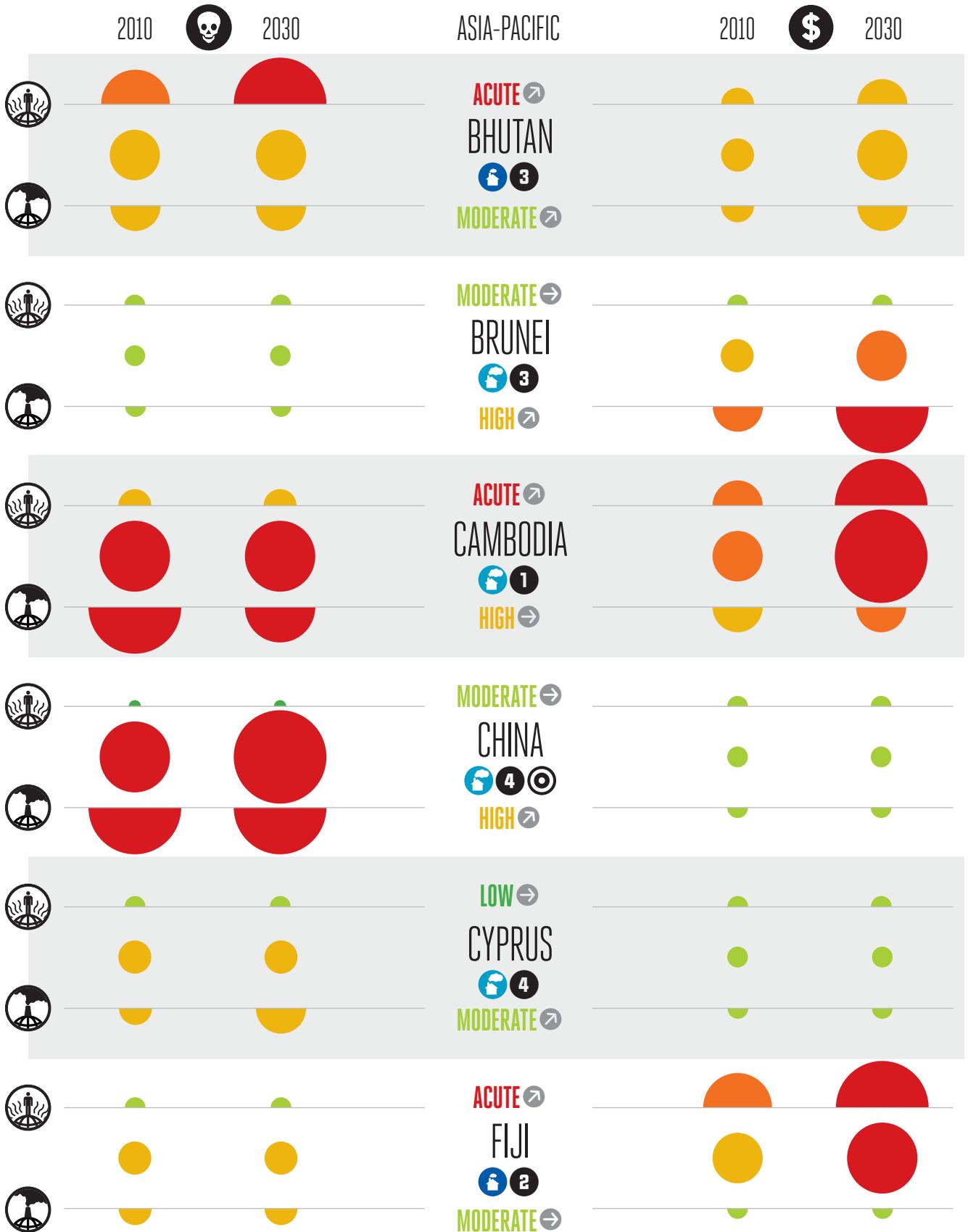
ASIA-PACIFIC

2010



2030





2010



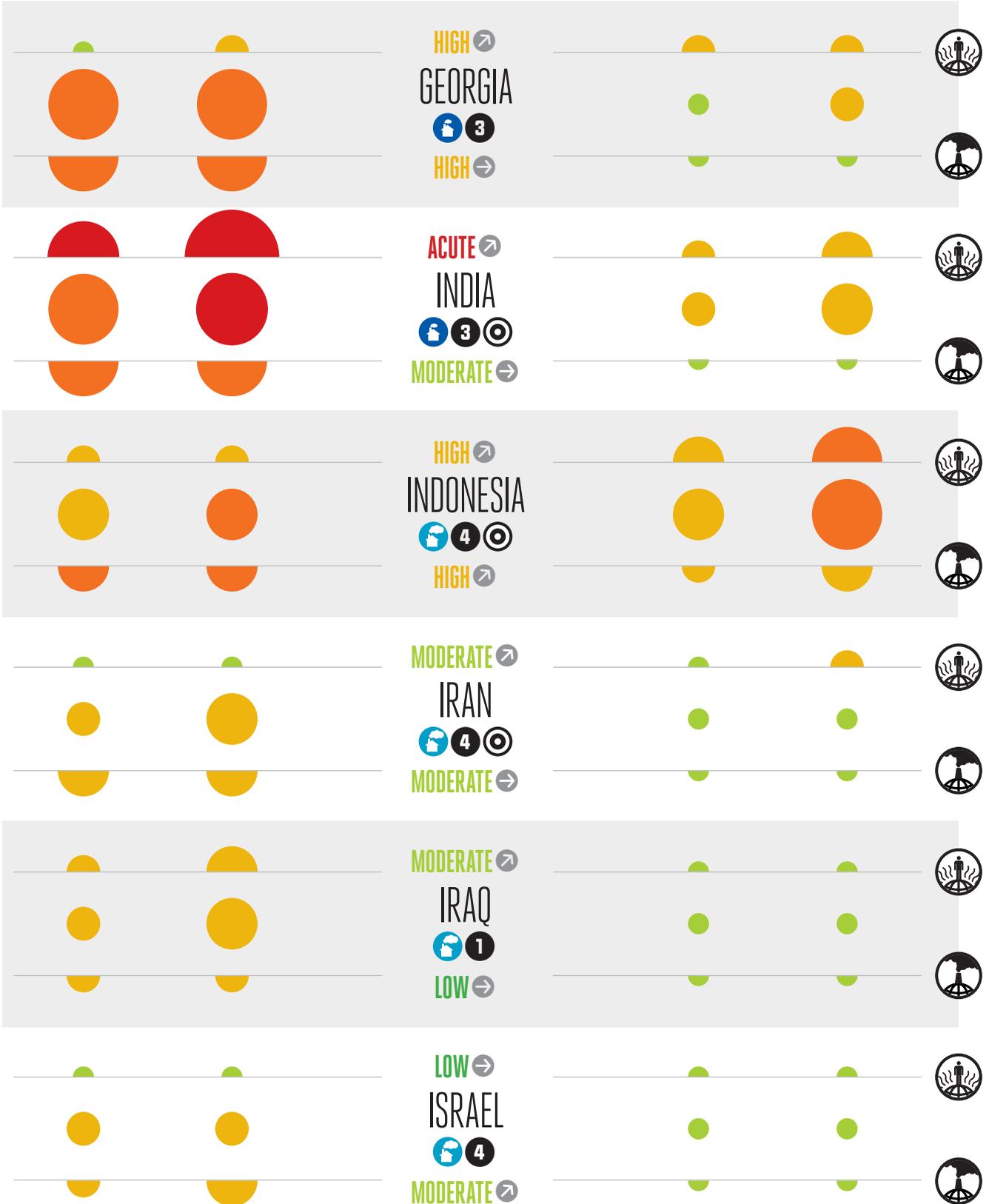
2030

ASIA-PACIFIC

2010



2030



HIGH →

GEORGIA

3

HIGH →

ACUTE →

INDIA

3

MODERATE →

HIGH →

INDONESIA

4

HIGH →

MODERATE →

IRAN

4

MODERATE →

MODERATE →

IRAQ

1

LOW →

LOW →

ISRAEL

4

MODERATE →

2010  2030

ASIA-PACIFIC

2010  2030

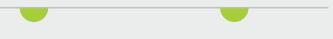
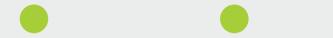
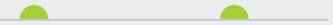


LOW →

JAPAN



MODERATE →



LOW →

JORDAN



LOW →

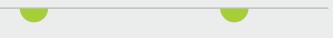
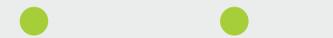
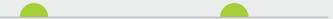


LOW →

KAZAKHSTAN



MODERATE →

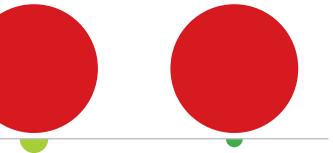


ACUTE →

KIRIBATI



LOW ↘

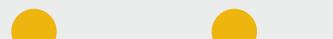
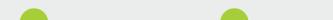


LOW →

KUWAIT



HIGH →



HIGH ↗

KYRGYZSTAN



MODERATE ↘



2010



2030

ASIA PACIFIC

2010



2030



ACUTE →

LAOS

1

HIGH →

2010

2030



MODERATE →

LEBANON

4

HIGH →

2010

2030



HIGH →

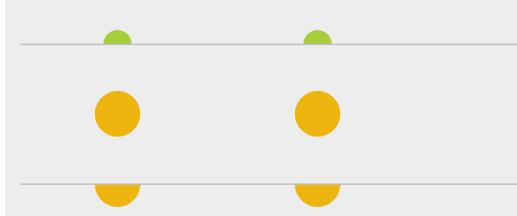
MALAYSIA

4

SEVERE →

2010

2030



SEVERE →

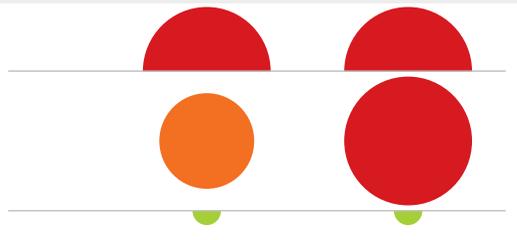
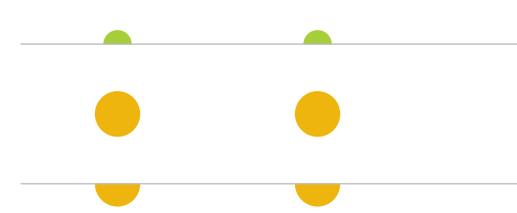
MALDIVES

3

LOW →

2010

2030



ACUTE →

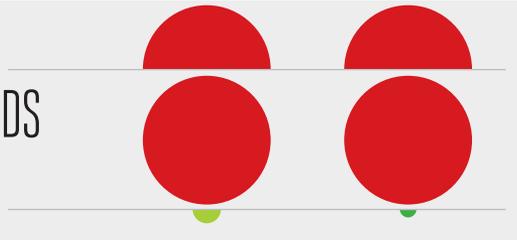
MARSHALL ISLANDS

1

MODERATE ↓

2010

2030



ACUTE →

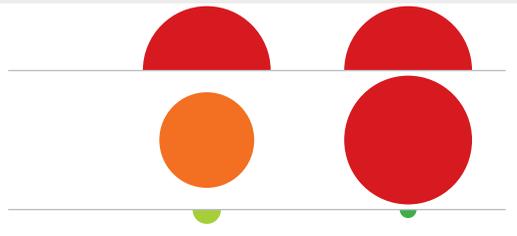
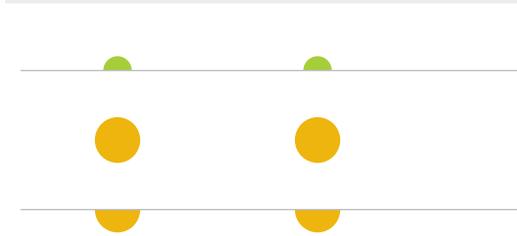
MICRONESIA

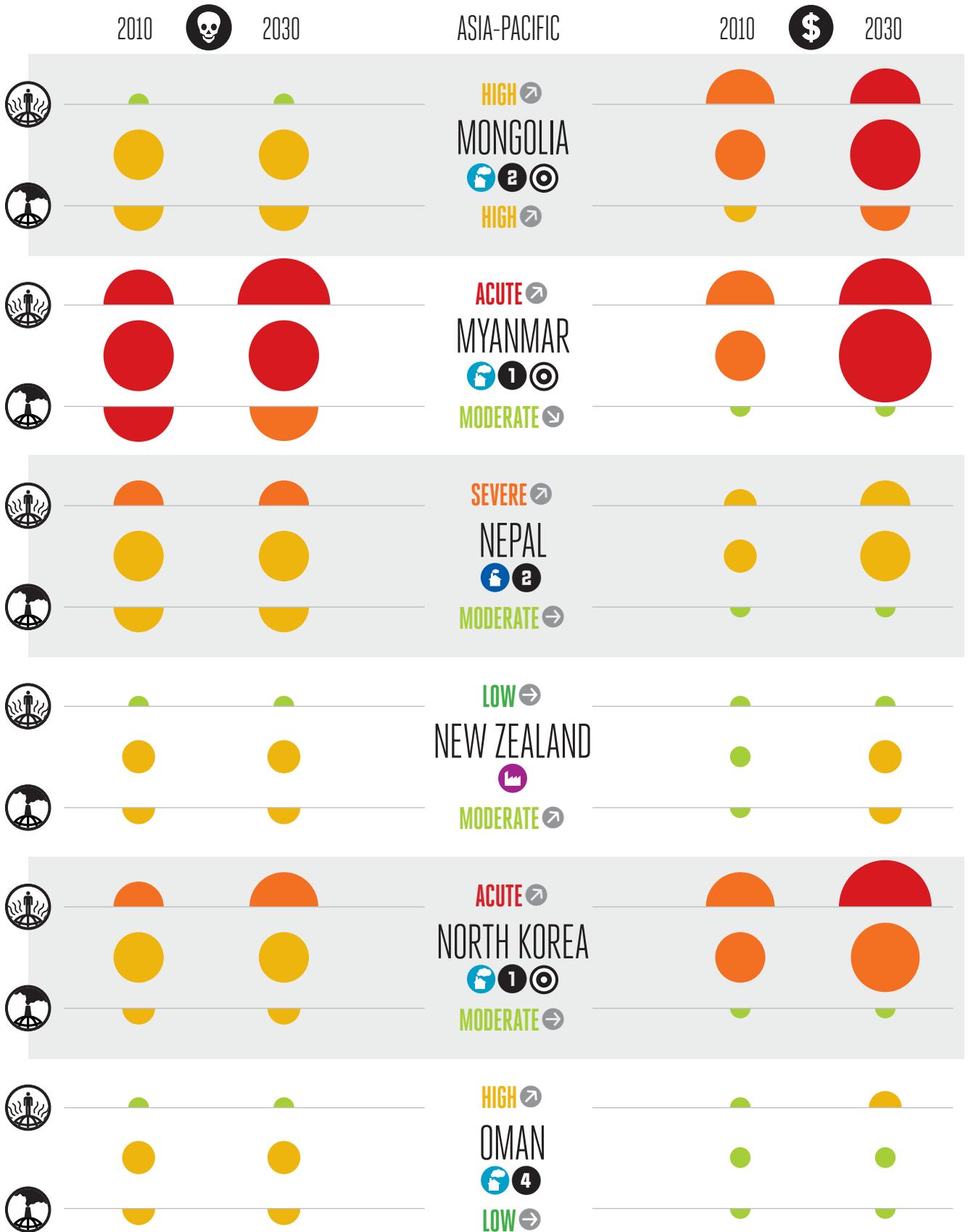
1

LOW ↓

2010

2030





2010



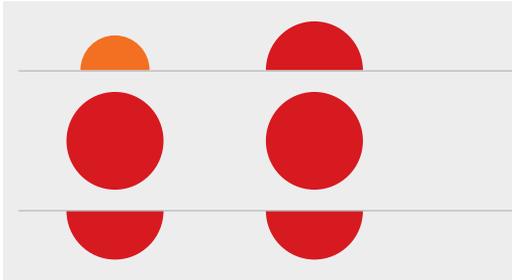
2030

ASIA-PACIFIC

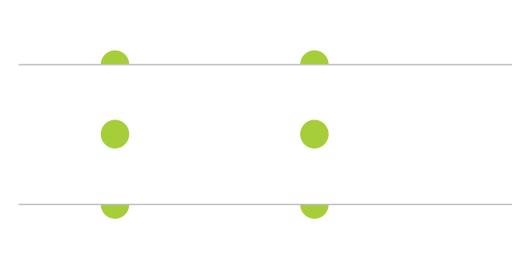
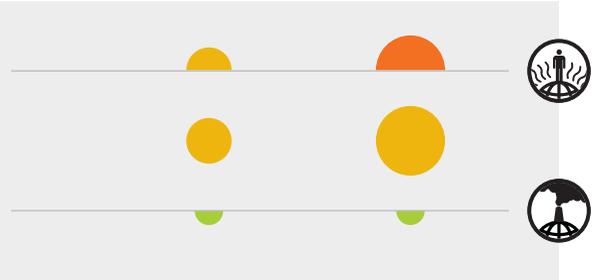
2010



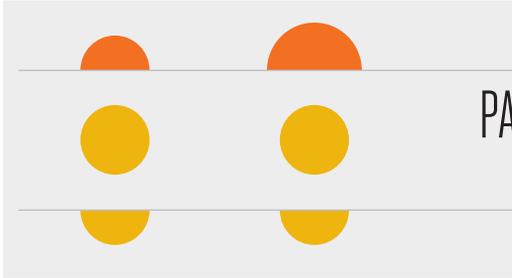
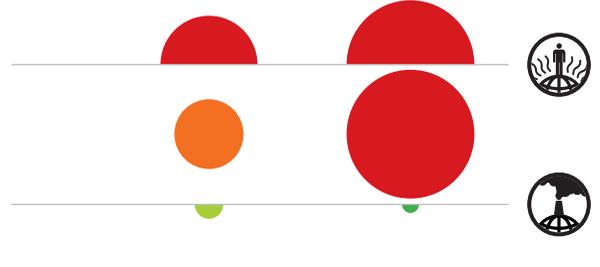
2030



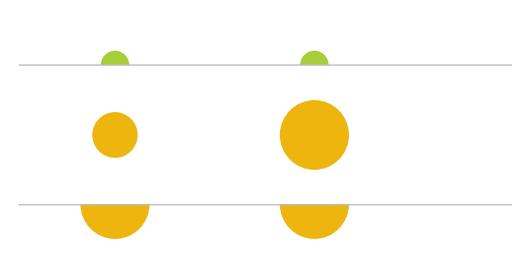
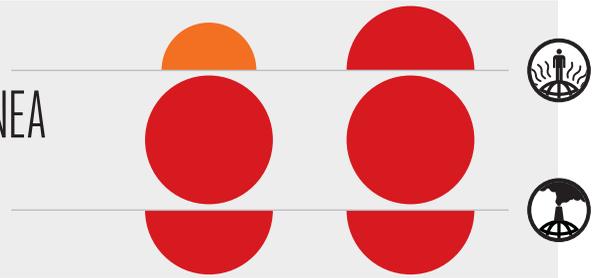
ACUTE ↗
PAKISTAN
 2
HIGH →



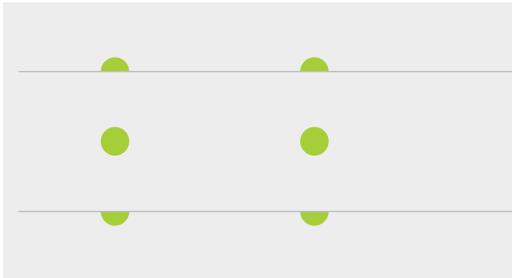
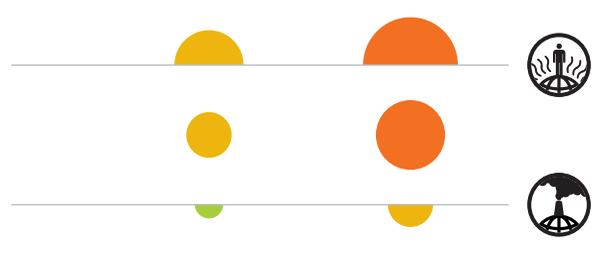
ACUTE ↗
PALAU
 1
LOW ↘



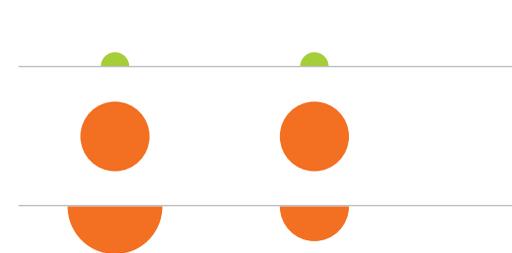
ACUTE ↗
PAPUA NEW GUINEA
 2
HIGH →



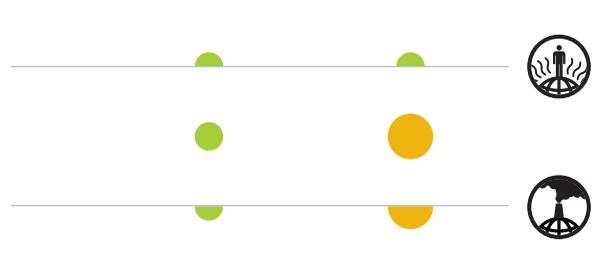
SEVERE ↗
PHILIPPINES
 3
MODERATE ↗

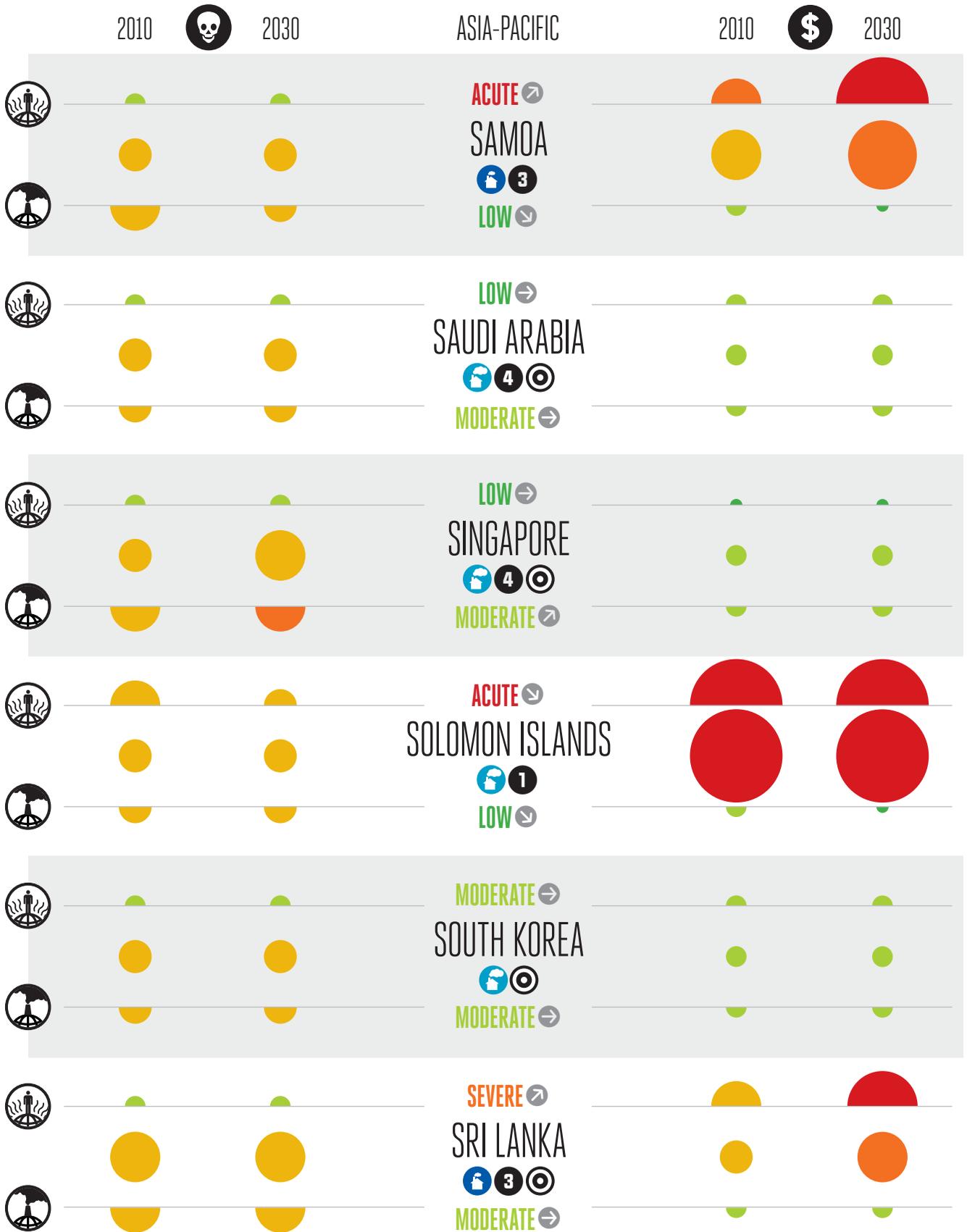


LOW ↘
QATAR
 4
MODERATE →



LOW ↘
RUSSIA
HIGH →





2010



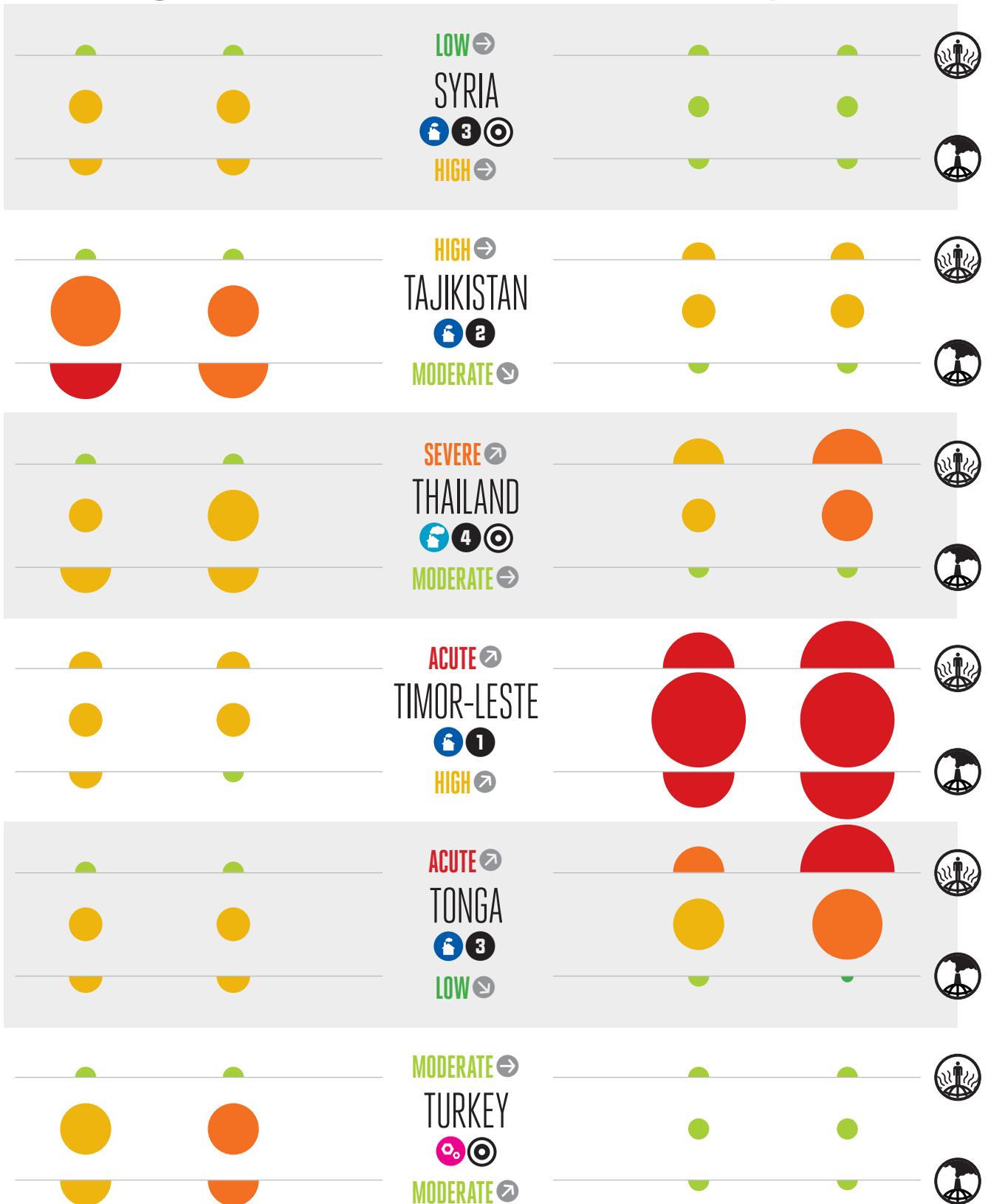
2030

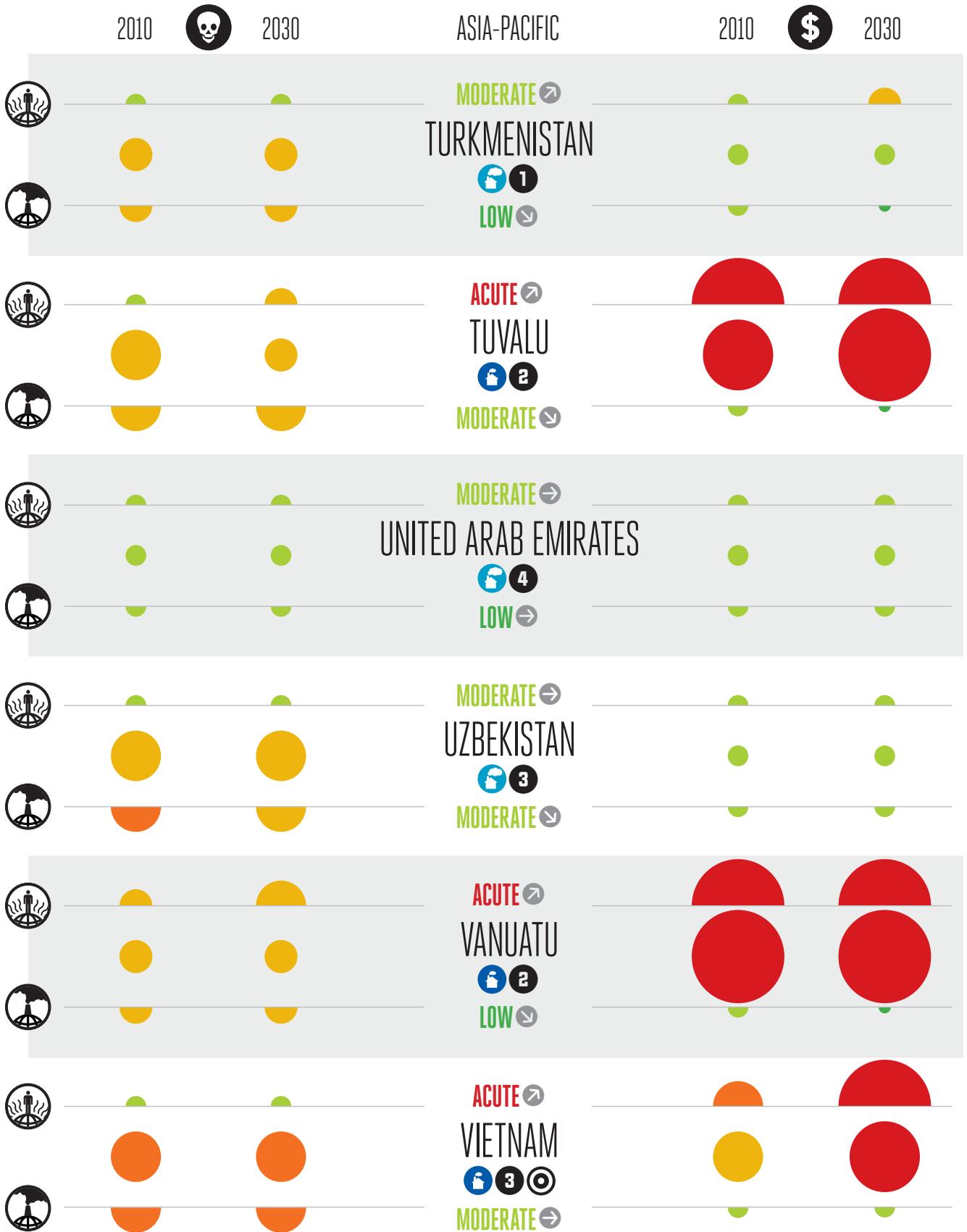
ASIA-PACIFIC

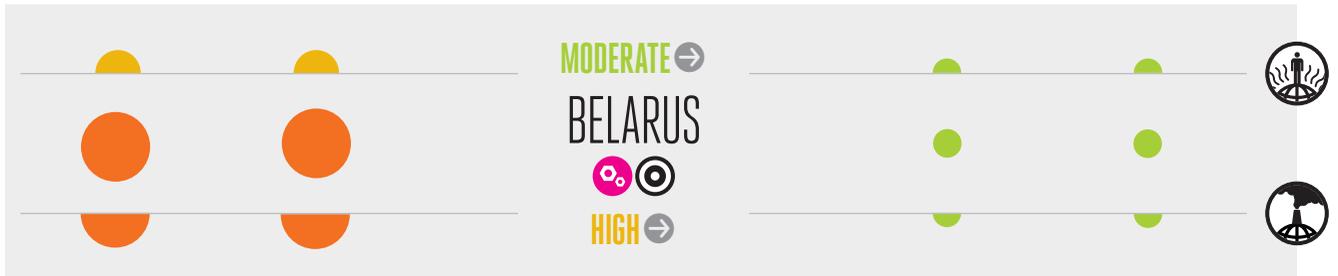
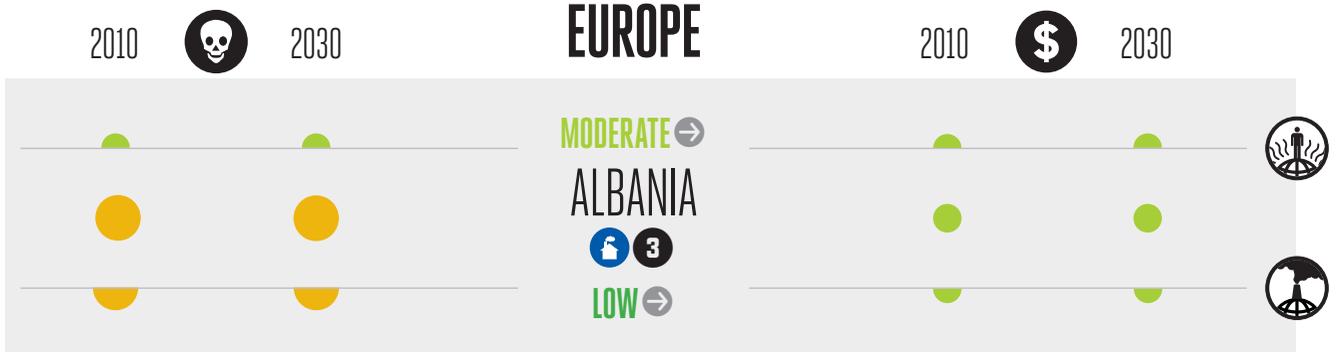
2010



2030







2010



2030

EUROPE

2010



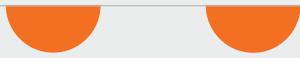
2030



MODERATE →
BOSNIA AND HERZEGOVINA



MODERATE →



MODERATE ↗

BULGARIA



SEVERE →



MODERATE ↗

CROATIA



MODERATE →



LOW →

CZECH REPUBLIC



MODERATE →



LOW →

DENMARK



MODERATE →



LOW →

ESTONIA



HIGH →



2010



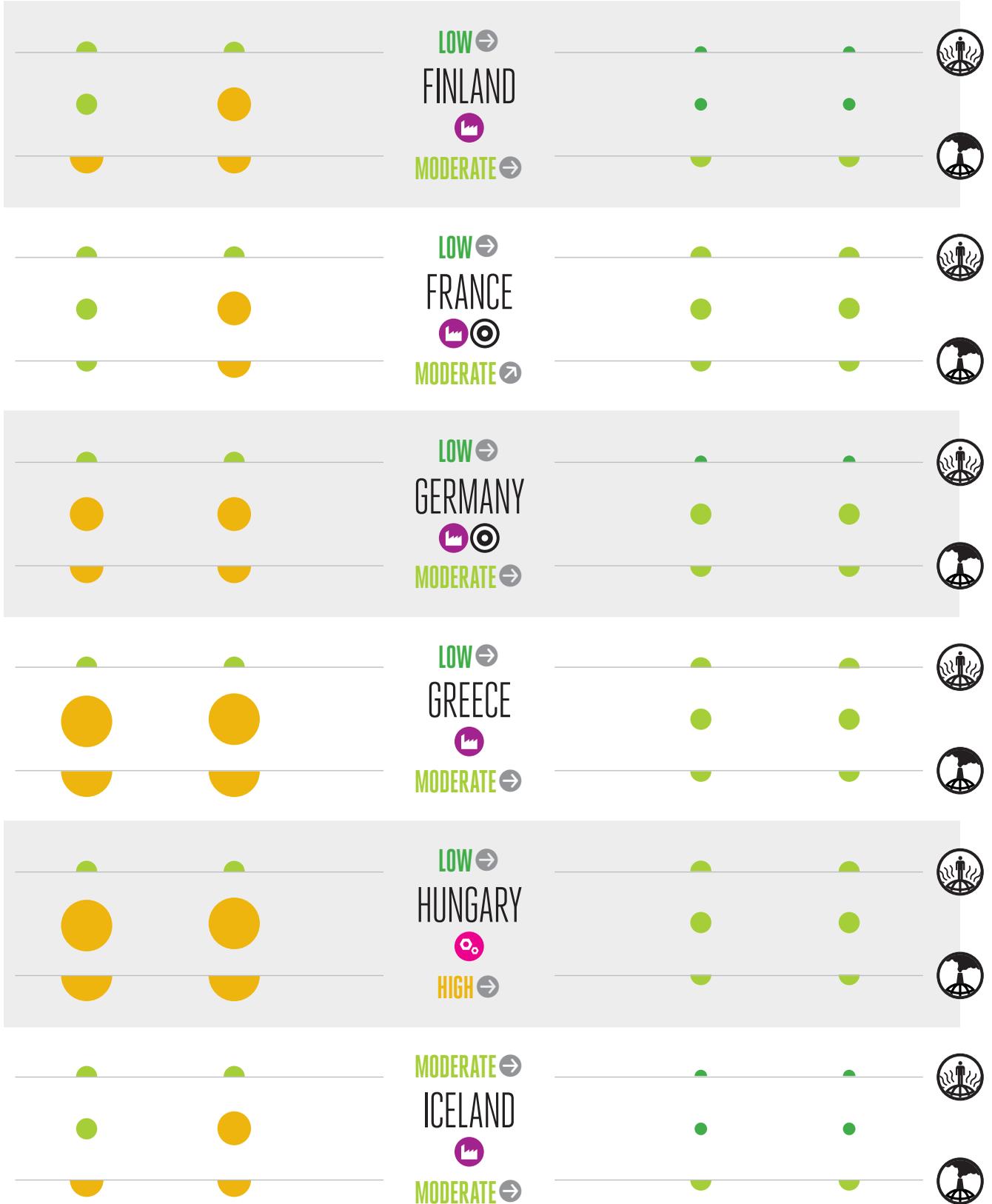
2030

EUROPE

2010



2030



2010



2030

EUROPE

2010



2030



LOW ↘

IRELAND



MODERATE →



LOW →

ITALY



MODERATE →



LOW →

LATVIA



HIGH ↗



LOW →

LITHUANIA



MODERATE →



LOW →

LUXEMBOURG



LOW →



MODERATE ↗

MACEDONIA



MODERATE →



2010



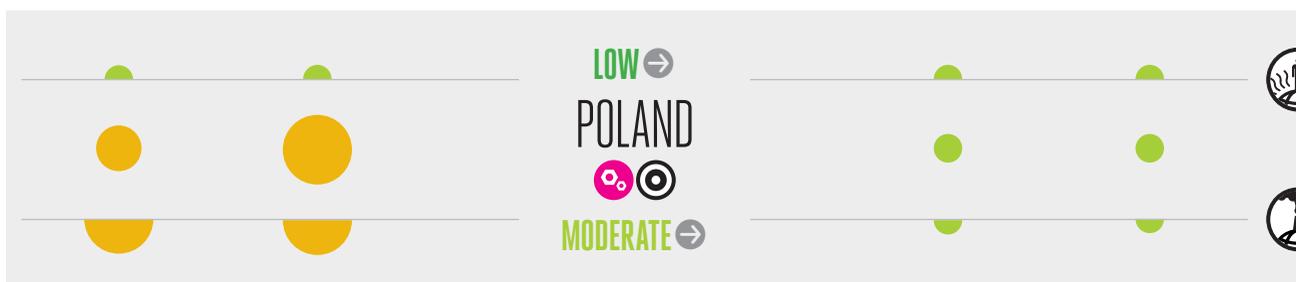
2030

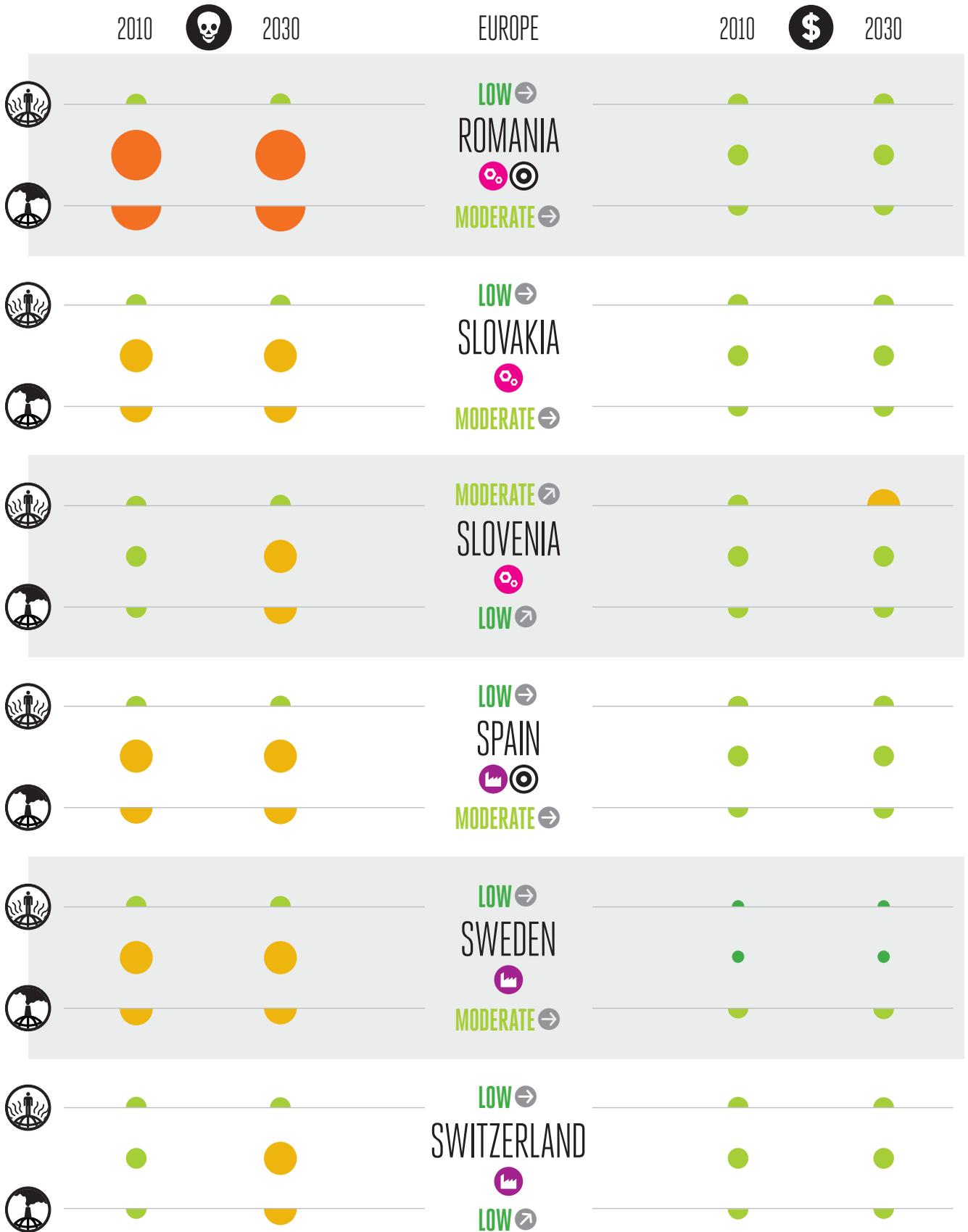
EUROPE

2010



2030

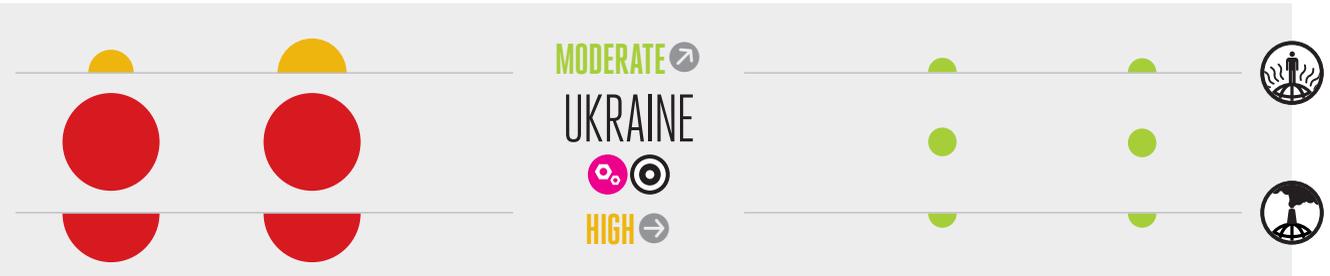




2010  2030

EUROPE

2010  2030



MODERATE →
UKRAINE
 
HIGH →



LOW →
UNITED KINGDOM
 
MODERATE →