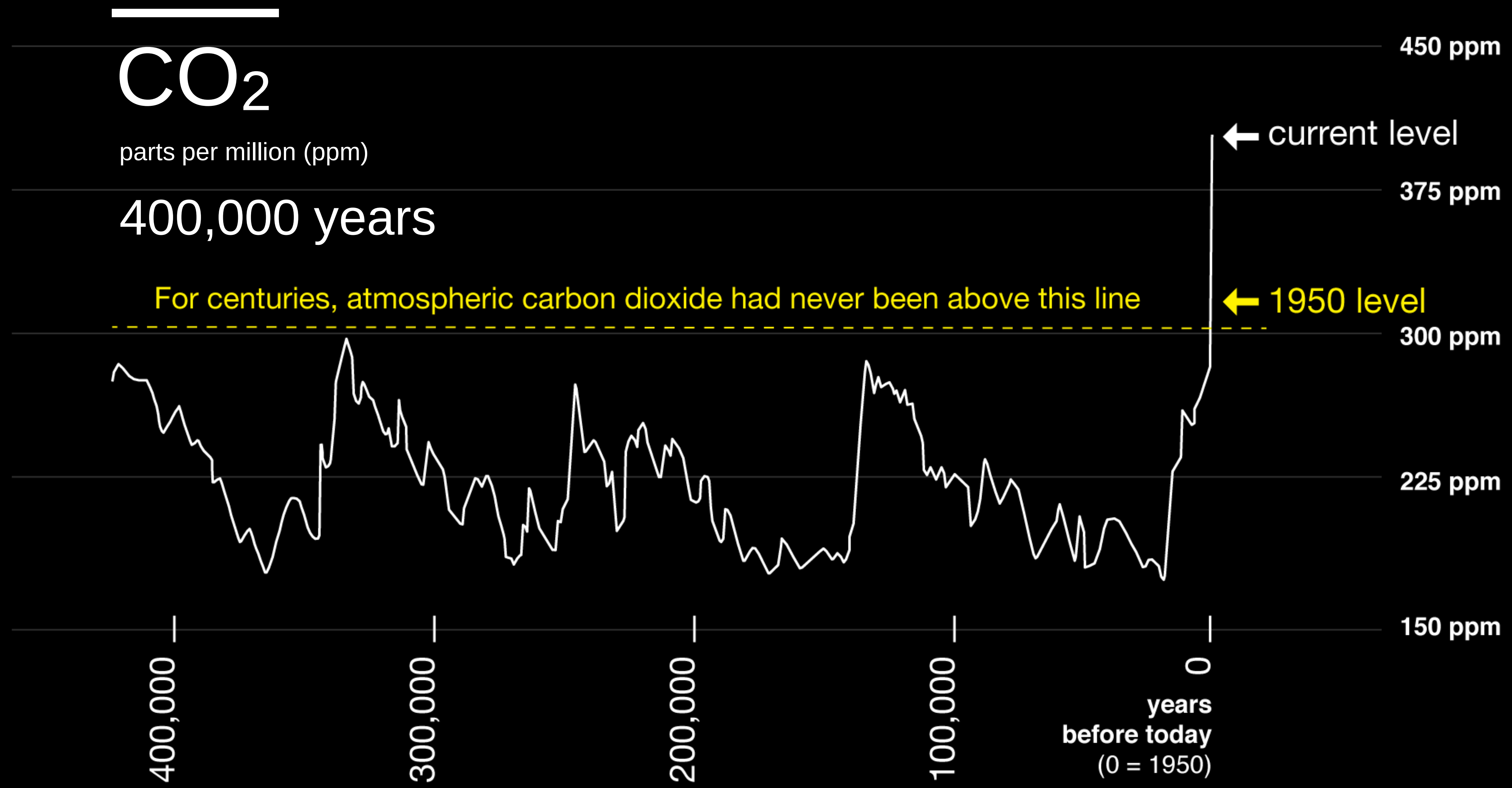
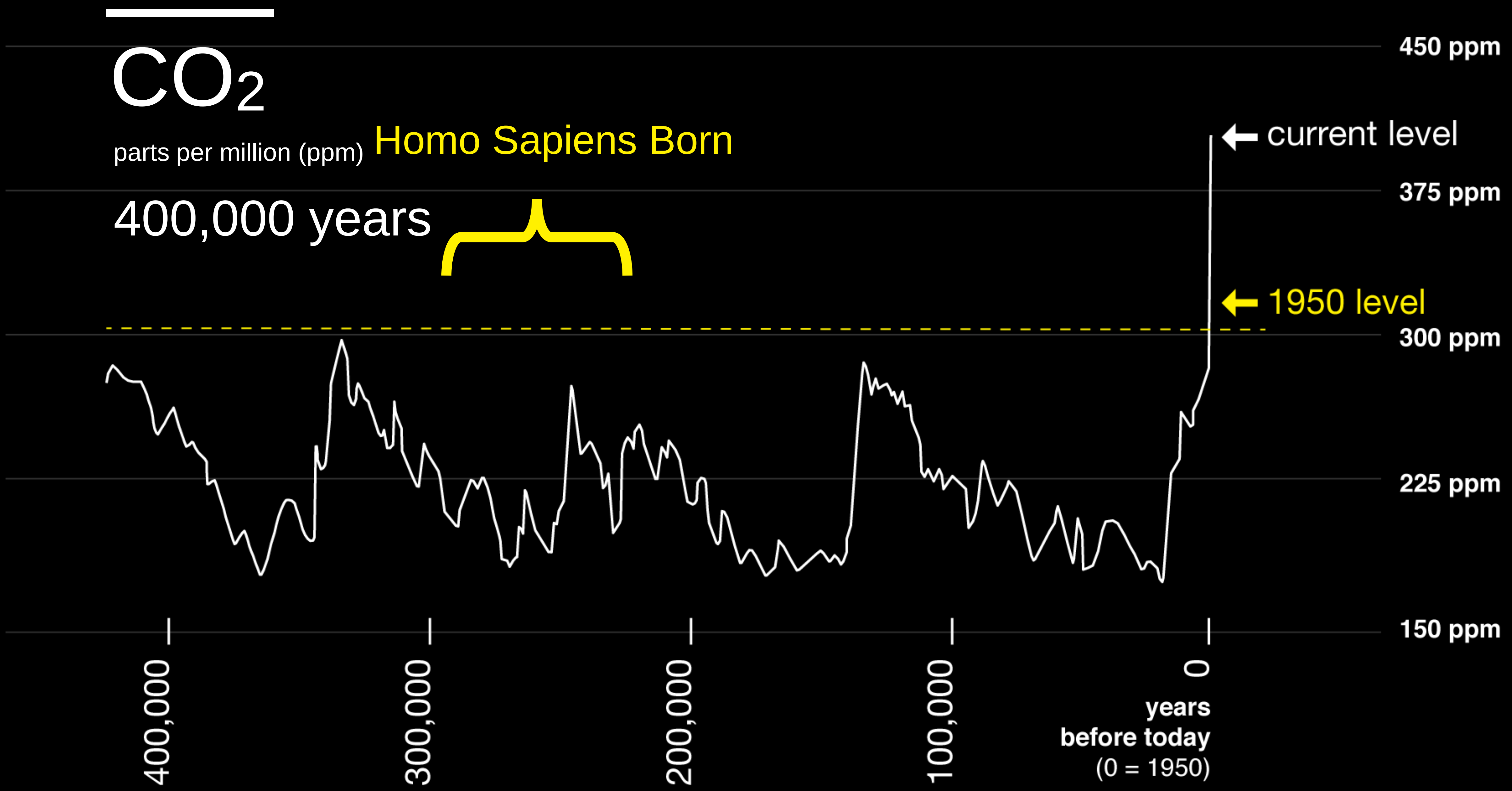
MODELLING DRAWDOWN

Ryan Allard, PhD; ryan.allard@drawdown.org

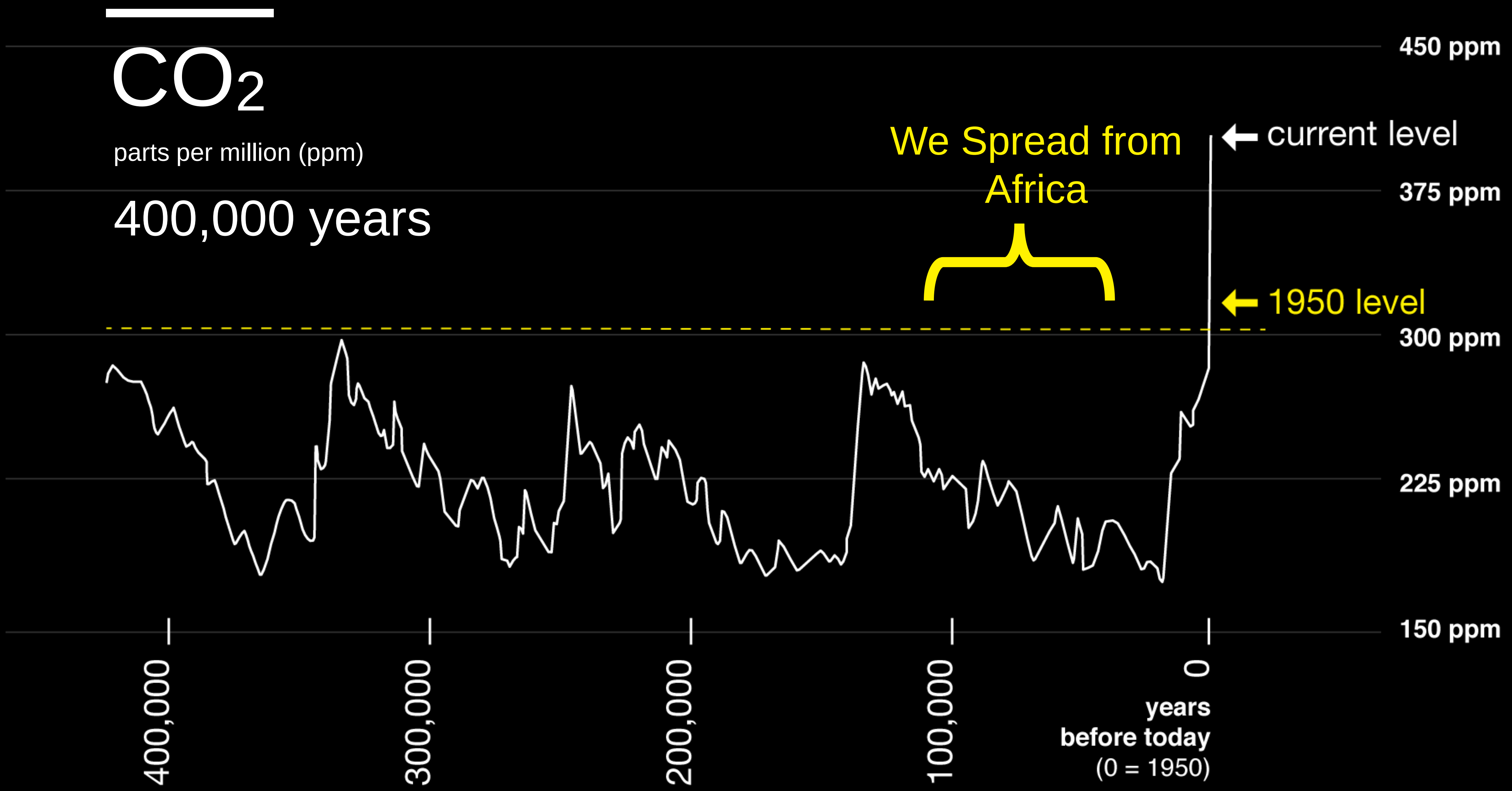
Senior Fellow, Transport and the Built Environment, **Project Drawdown**



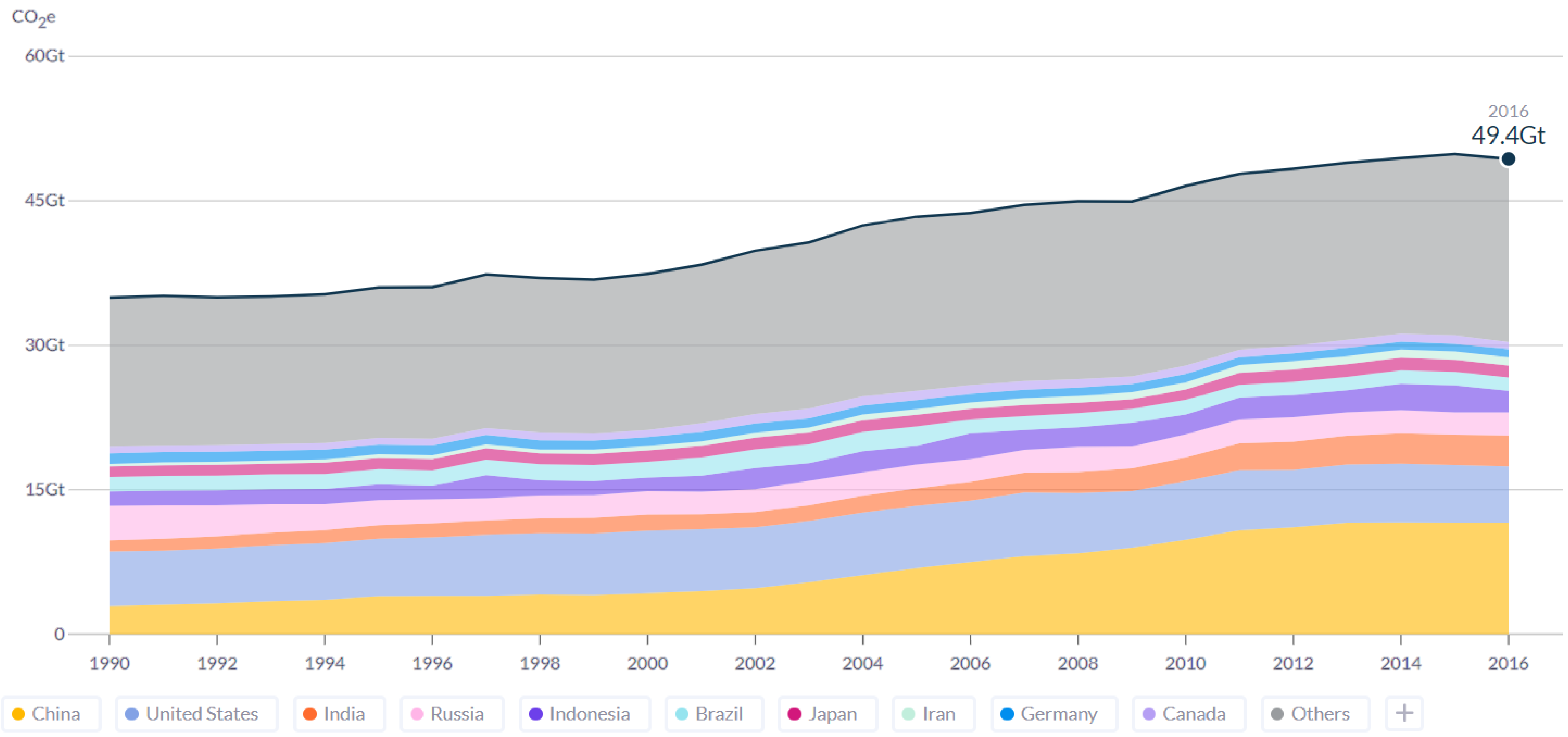
CO2
parts per million (ppm)
400,000 years
For centuries, atmospheric carbon dioxide had never been above this line
current level
1950 level
450 ppm
375 ppm
300 ppm
225 ppm
150 ppm
400,000
300,000
200,000
100,000
0
years
before today
(0 = 1950)



CO2
parts per million (ppm)
Homo Sapiens Born
400,000 years
current level
1950 level
450 ppm
375 ppm
300 ppm
225 ppm
150 ppm
400,000
300,000
200,000
100,000
0
years
before today
(0 = 1950)


CO2
parts per million (ppm)
400,000 years
We Spread from Africa
current level
1950 level
450 ppm
375 ppm
300 ppm
225 ppm
150 ppm
400,000
300,000
200,000
100,000
0
years before today
(0 = 1950)

Global Historical Emissions



Climate Watch. 2018. Washington, DC: World Resources Institute. Available online at: https://www.climatewatchdata.org

Dealing with Climate Change: 2 Methods

1. Mitigation
   - Reducing Emissions

2. Adaptation
   - Reducing Vulnerability

Project Drawdown Measures Mitigation potential of Solutions.

Drawdown Research Process & Methodology

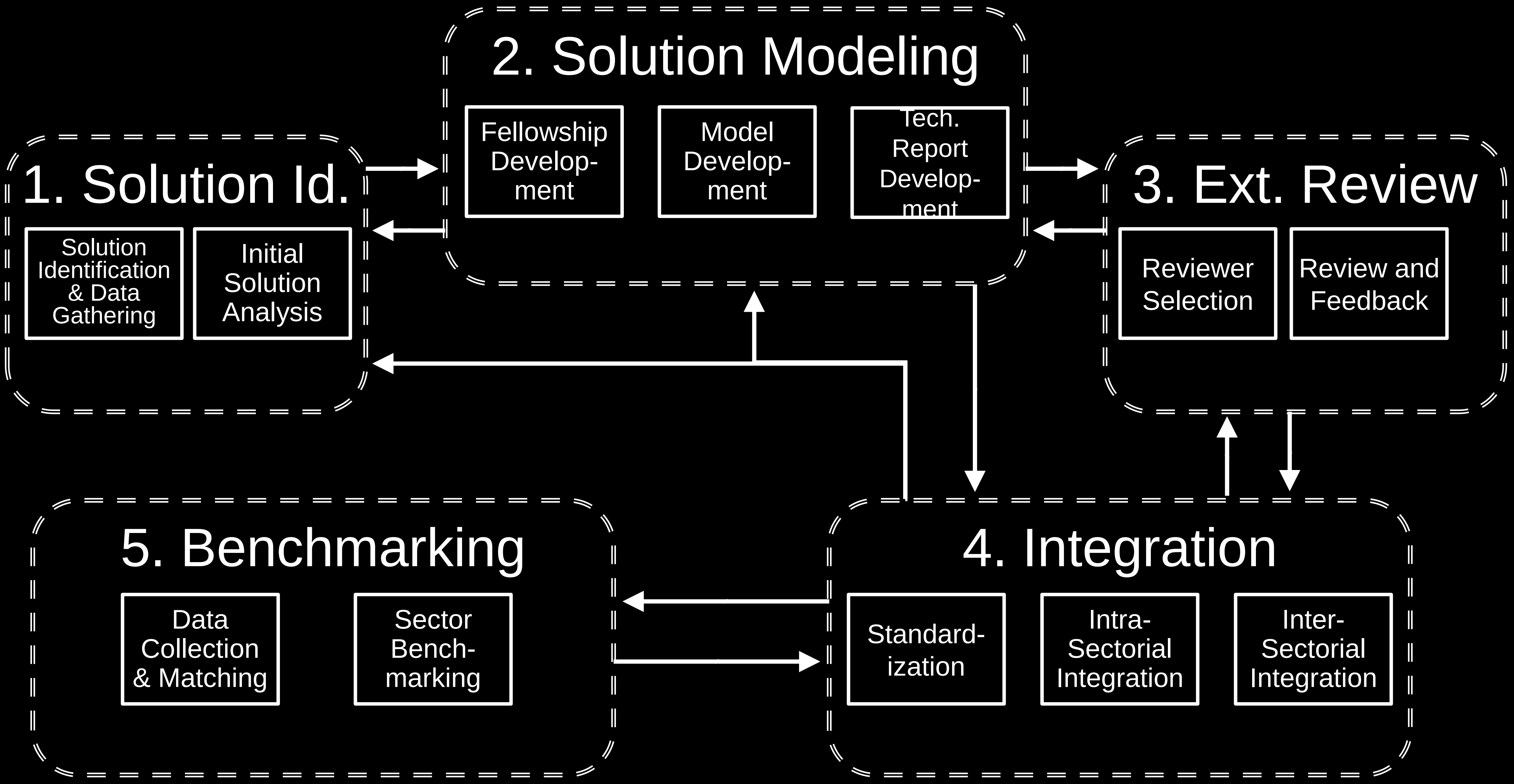
DRAWDOWN is the point when greenhouse gas levels in the atmosphere start to decline.

We believe stopping and beginning to reverse global warming is possible, with solutions that exist today.

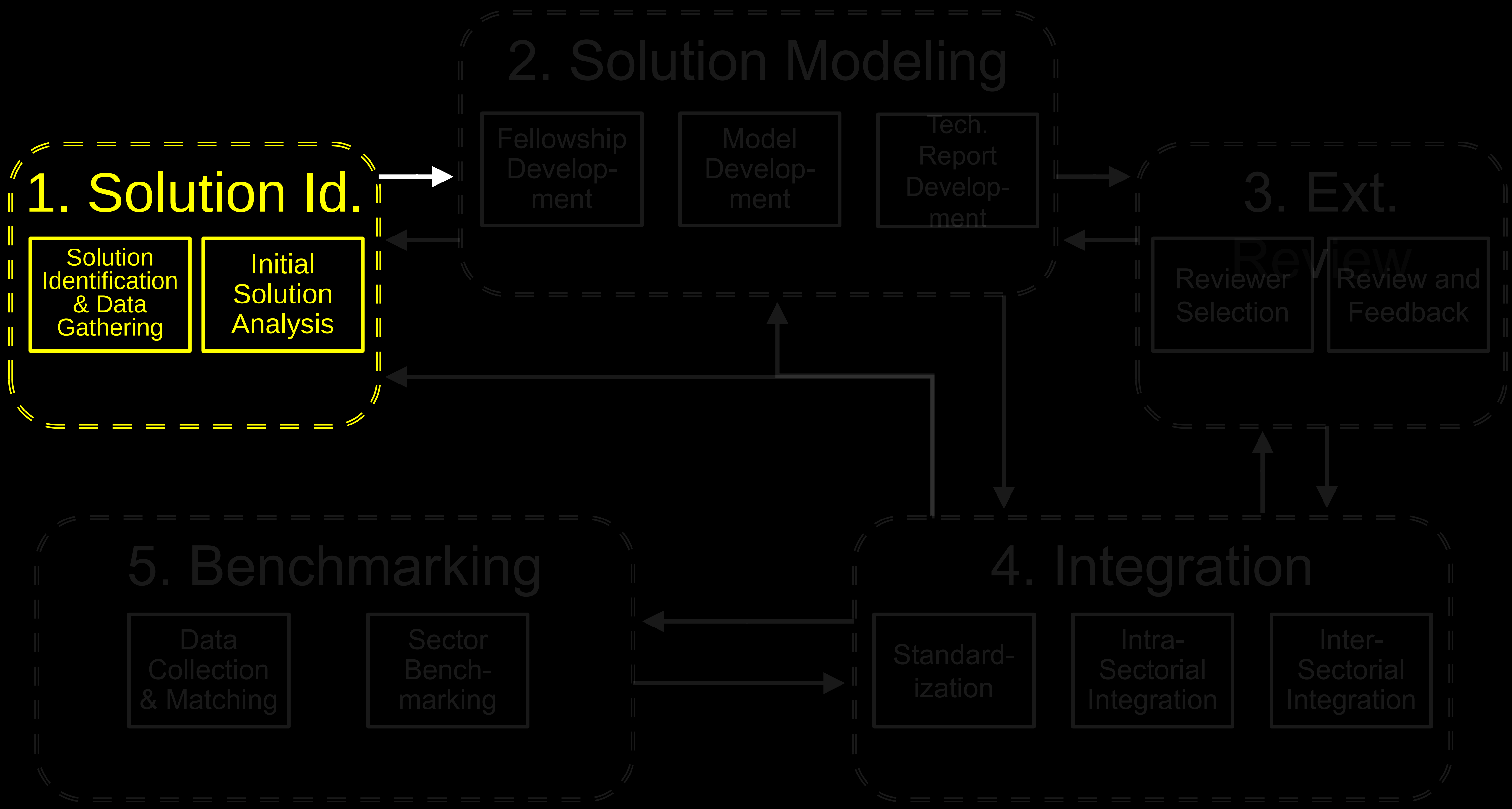
The Modelling Process

1. Solution Identification
2. Solution Modeling
3. External Review
4. Integration
5. Benchmarking

The Modelling Process



The Modelling Process



Potential Solutions

REPLACE Emissions

REDUCE Emissions

RESTORE (Sequester)

Potential Solutions

1. Is it scientifically valid?
2. Is it financially viable?
3. Is it scaling or being broadly adopted?
4. Do the positive externalities outweigh the negative?
5. Does it have the potential for at least 1Gt of CO_2-eq reduced and/or avoided over 30 years?

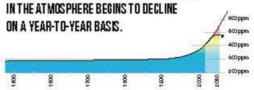
DRAWDOWN

100 SOLUTIONS TO REVERSE GLOBAL WARMING BY 2050

RANKED BY IMPACT

drawdown.org

DRAWDOWN IS THAT POINT IN TIME WHEN THE CONCENTRATION OF GREENHOUSE GASES IN THE ATMOSPHERE BEGINS TO DECLINE ON A YEAR-TO-YEAR BASIS.



Project Drawdown is the most comprehensive plan ever proposed to reverse global warming. Our organization did not make or devise the plan—we found the plan because it already exists. We gathered a qualified and diverse group of researchers from around the world to identify, research, and model the 100 most substantive, existing solutions to address climate change. What was uncovered is a path forward that can roll back global warming within thirty years. It shows that humanity has the means at hand. Our work is to accelerate the knowledge and growth of what is possible. We chose the name Drawdown because if we do not name the goal, we are unlikely to achieve it.

EACH SOLUTION REDUCES GREENHOUSE GASES BY AVOIDING EMISSIONS AND/OR BY SEQUESTERING CARBON DIOXIDE ALREADY IN THE ATMOSPHERE.

Afforestation—creating forests where there were none before—creates a carbon sink, drawing in and holding on to carbon and distributing it into the soil.

18.06 GT REDUCED CO2 #15

The airline industry produces at minimum 2.5 percent of emissions, and it is growing. Fuel efficiency measures are on the rise to reduce that impact.

5.05 GT REDUCED CO2 #43

Cement, a vital material for infrastructure, generates 5 to 6 percent of annual emissions. The key strategy to reduce them is to change its composition.

6.69 GT REDUCED CO2 #36

The artificial leaf is technology inspired by photosynthesis. It combines solar energy, water, and carbon dioxide, to feed bacteria that synthesize energy-dense fuel.

Autonomous vehicles are on the rise. They have the potential to shrink the auto fleet and accelerate ridesharing and the adoption of electric vehicles.

Bamboo rapidly sequesters carbon in biomass and soil and can thrive on degraded lands. It has more than 1,000 uses, from buildings to food to paper.

7.22 GT REDUCED CO2 #35

2.31 GT REDUCED CO2 #59

Food
BIOCHAR
Biochar results from slowly baking biomass in the absence of oxygen. Retaining most of the feedstock's carbon, biochar can be buried for sequestration, while enriching soil.
0.81 GT REDUCED CO2 #72

Materials
BIOPLASTIC
Ninety percent of plastics could be derived from plants instead of fossil fuels. Bio-plastics can be biodegradable and often have lower emissions.
4.30 GT REDUCED CO2 #47

Buildings and Cities
BUILDING AUTOMATION
Building automation systems serve as the "brain" of large commercial buildings. Controlling temperature, lighting, and more, they can improve energy efficiency and occupants' comfort.
4.62 GT REDUCED CO2 #45

Coming Attractions
BUILDING WITH WOOD
High-performance wood materials are transforming construction. They can reduce emissions by (1) sequestering and storing carbon and (2) avoiding emissions of cement and steel.

Transport
CARS
Hybrid cars pair an electric motor and battery with an internal combustion engine. The combination makes them more efficient, improving fuel economy and lowering emissions.
4.00 GT REDUCED CO2 #49

Food
CLEAN COOKSTOVES
Traditional cooking practices produce toxic smoke and 2 to 5 percent of annual greenhouse gas emissions. Clean cookstoves reduce emissions and protect human health.
15.81 GT REDUCED CO2 #21

Land Use
COASTAL WETLAND
The world's salt marshes, mangroves, and sea grasses provide vital habitat, flood protection, and water filtration, and sequester huge amounts of carbon in plants and soil.
3.19 GT REDUCED CO2 #52

Energy
COGENERATION
Power plants produce large amounts of waste heat. Cogeneration systems capture that thermal energy and put it to work—for district heating or additional electricity.
3.97 GT REDUCED CO2 #50

Food
COMPOSTING
From backyard bins to industrial-scale operations, composting food waste converts organic material into stable soil carbon and valuable fertilizer, averting methane emissions.
2.28 GT REDUCED CO2 #60

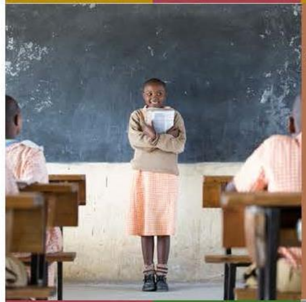
Energy
CONCENTRATED SOLAR
Concentrated solar power uses solar radiation as its primary fuel. Arrays of mirrors concentrate incoming rays to heat a fluid, produce steam, and turn turbines.
10.90 GT REDUCED CO2 #25

Food
CONSERVATION AGRICULTURE
Conservation agriculture avoids tilling and employs cover crops and crop rotation. By protecting the soil, it makes land more resilient and sequesters carbon.
17.35 GT REDUCED CO2 #16

Coming Attractions
DIRECT AIR CAPTURE
Direct Air Capture systems are a nascent sequestration technology. Functioning like a chemical sieve and sponge, they capture carbon dioxide from air and release it in purified form.

Coming Attractions
A COW WALKS ONTO A BEACH
Asparagopsis taxiformis, a species of seaweed, shows promise for reducing methane emissions from livestock—currently 4 to 5 percent of annual greenhouse gas emissions.

Buildings and Cities
DISTRICT HEATING
With district systems, a central plant channels hot and/or cool water via a network of pipes to many buildings—heating and cooling them more efficiently.
9.38 GT REDUCED CO2 #27



Women and Girls
EDUCATING GIRLS
Education lays a foundation for vibrant lives for girls and women, their families, and their communities. It also avoids emissions by curbing population growth.
59.60 GT REDUCED CO2 #6

Transport
ELECTRIC BIKES
Electric bikes get a boost from a small battery-powered motor. They are the most environmentally sound means of motorized transport in the world today.
0.96 GT REDUCED CO2 #69

Transport
ELECTRIC VEHICLES
Electric vehicles are the cars of the future. If powered by solar energy, their carbon dioxide emissions drop by 95 percent compared to gasoline-powered vehicles.
10.80 GT REDUCED CO2 #26

Energy
ENERGY STORAGE (DISTRIBUTED)
Standalone batteries and electric vehicles make it possible to store energy at home or work. They ensure supply even when variable renewables are not producing.
AN ENABLING TECHNOLOGY-COST AND SAVINGS ARE EMBEDDED IN RENEWABLE ENERGY #77

Energy
ENERGY STORAGE (UTILITIES)
Energy storage—daily, multiday, and longer-term or seasonal—is vital to reduce emissions from polluting "peaker" plants and accommodate the shift to variable renewables.
AN ENABLING TECHNOLOGY-COST AND SAVINGS ARE EMBEDDED IN RENEWABLE ENERGY #77

Coming Attractions
ENHANCED WEATHERING OF MINERALS
Natural weathering of silicate rock sequesters carbon dioxide. Enhanced weathering aims to hasten that process by milling rock powder and applying it to landscapes.

Women and Girls
FAMILY PLANNING
Securing women's right to voluntary, high-quality family planning dramatically improves the health and well-being of women and their children. It also avoids emissions.
59.60 GT REDUCED CO2 #7

Food
FARMLAND IRRIGATION
Pumping and distributing water requires large quantities of energy. Drip and sprinkler irrigation, among other practices and technologies, make water use more precise and efficient.
1.33 GT REDUCED CO2 #67

Food
FARMLAND RESTORATION
The world's abandoned farmland is an opportunity for drawdown. Restoring it sequesters carbon and can improve food security, farmers' livelihoods, and ecosystem health.
14.08 GT REDUCED CO2 #23

Land Use
FOREST PROTECTION
With mature canopy trees and complex understories, primary forests contain 300 billion tons of carbon and are the greatest repositories of biodiversity on the planet.
6.20 GT REDUCED CO2 #38

Energy
GEOTHERMAL
Geothermal power—literally "earth heat"—taps into underground reservoirs of steamy hot water, which can be piped to the surface to drive turbines that produce electricity.
16.60 GT REDUCED CO2 #18

Buildings and Cities
GREEN ROOFS
Green roofs use soil and vegetation as living insulation. Cool roofs reflect solar energy. Both reduce building energy use for heating and/or cooling.
0.77 GT REDUCED CO2 #73

Energy
GRID FLEXIBILITY
For electricity supply to become predominantly or entirely renewable, the grid needs to become more flexible and adaptable than it is today.
AN ENABLING TECHNOLOGY-COST AND SAVINGS ARE EMBEDDED IN RENEWABLE ENERGY #77

Buildings and Cities
HEAT PUMPS
Heat pumps transfers heat from a cold space to a hot one. Highly efficient, they can dramatically lower building energy use for heating and cooling.
5.20 GT REDUCED CO2 #42

Transport
HIGH-SPEED RAIL
High-speed rail is the fastest way to travel distances between 100 to 700 miles. Compared to driving or flying, it reduces emissions up to 90 percent.
1.52 GT REDUCED CO2 #66

Materials
HOUSEHOLD RECYCLING
Household recycling can reduce emissions because producing new products from recovered materials often saves energy. It also reduces resource extraction and creates jobs.
2.77 GT REDUCED CO2 #55

Coming Attractions
HYDROGEN-BORON FUSION
Tri Alpha Energy has achieved one-half of the nuclear fusion equation. It could herald clean, safe, affordable energy to take the world beyond fossil fuels.

Coming Attractions
HYPERLOOP
The promise of Hyperloop is speed. The virtue is moving people and cargo with 90 to 95 percent less energy than planes, trains, or cars.

Food
IMPROVED RICE CULTIVATION
Flooded rice paddies produce large quantities of methane—10 percent of agricultural emissions. Techniques exist to reduce methane, while improving production and sequestering carbon.
11.34 GT REDUCED CO2 #24

Energy
IN-STREAM HYDRO
Placed within a free-flowing river or stream, in-stream turbines capture water's energy without a dam. In remote communities, they can replace expensive, dirty diesel generators.
4.00 GT REDUCED CO2 #48

Land Use
INDIGENOUS PEOPLES' LAND MANAGEMENT
Growing the acreage under secure indigenous land tenure can increase above- and belowground carbon stocks and reduce greenhouse gas emissions from deforestation.
6.19 GT REDUCED CO2 #39

Coming Attractions
INDUSTRIAL HEMP
Hemp is a global warming solution primarily because of what it can replace: cotton. Cotton has high chemical use and depends on fossil fuel inputs.

Materials
INDUSTRIAL RECYCLING
Industrial recycling reduces emissions when new products are made from recovered materials, rather than virgin resources. It can also address the challenge of resource scarcity.
2.77 GT REDUCED CO2 #56

Buildings and Cities
INSULATION
Insulation is one of the most cost-effective ways to make buildings more energy efficient—both in new construction and through retrofitting older buildings.
8.27 GT REDUCED CO2 #31

Coming Attractions
INTENSIVE SILVOPASTURE
Intensive silvopasture intercrops a leguminous woody shrub with grasses and trees. Through rapid rotational grazing, livestock yields increase alongside carbon sequestration in soil.

Buildings and Cities
LANDFILL METHANE
Landfills are a top source of methane emissions. Instead, landfill methane can be captured, preventing emissions, and used as a fairly clean energy source.
2.50 GT REDUCED CO2 #58

Buildings and Cities
LED LIGHTING (COMMERCIAL)
Lighting accounts for 15 percent of global electricity use. LEDs (light emitting diodes) require less energy and create less waste heat than other bulbs.
5.04 GT REDUCED CO2 #44

Buildings and Cities
LED LIGHTING (HOUSEHOLD)
By transferring most of their energy use into creating light—rather than heat, like older technologies—LEDs reduce electricity consumption and air-conditioning loads.
7.81 GT REDUCED CO2 #33

Coming Attractions
LIVING BUILDINGS
The Living Building Challenge holistically defines how buildings can benefit both people and planet. One key criteria: Living buildings produce more energy than they use.

Food
MANAGED GRAZING
Managed grazing imitates the activity of migratory herds to improve soil health, carbon sequestration, water retention, and forage productivity.
16.34 GT REDUCED CO2 #19

Coming Attractions
MARINE PERMACULTURE
Marine permaculture utilizes floating, latticed structures designed to grow rich kelp forests and foster marine life. It could sequester billions of tons of carbon dioxide.

Transport
MASS TRANSIT
Riding a streetcar, bus, or subway—rather than driving a car or hailing a cab—averts greenhouse gases, relieves traffic congestion, and reduces air pollution.
6.57 GT REDUCED CO2 #37

Energy
METHANE DIGESTERS (LARGE)
Industrial-scale anaerobic digesters control decomposition of organic waste, and thus its methane emissions. They also produce biogas, an energy source, and digestate, a nutrient-rich fertilizer.
8.40 GT REDUCED CO2 #30

Energy
METHANE DIGESTERS (SMALL)
At backyard- and farmyard-scale, anaerobic digesters are used to manage organic waste. They control methane emissions, while producing biogas (an energy source) and digestate (nutrient-rich fertilizer).
1.90 GT REDUCED CO2 #64

Energy
MICRO WIND
With capacity of 100 kilowatts or less, micro wind turbines are often used to pump water, charge batteries, and provide electrification in rural locations.
0.20 GT REDUCED CO2 #76

Coming Attractions
MICROBIAL FARMING
Microbes have the potential to dramatically reduce the need for synthetic fertilizers, pesticides, and herbicides, while improving crop yields and plant health.

Energy
MICROGRIDS
A microgrid is a localized grouping of distributed energy sources, like solar and wind, together with energy storage or backup generation and load management tools.
AN ENABLING TECHNOLOGY-COST AND SAVINGS ARE EMBEDDED IN RENEWABLE ENERGY #78

Food
MULTISTRATA AGROFORESTRY
Multistrata agroforestry blends taller trees and one or more layers of crops. It achieves high rates of carbon sequestration, similar to forests, while producing food.
9.28 GT REDUCED CO2 #28

Buildings and Cities
NET ZERO BUILDINGS
A net zero building is one that has zero net energy consumption, producing as much energy, through onsite renewables, as it uses in a year.
COST AND SAVINGS MODELED IN RENEWABLE ENERGY AND OTHER TECHNOLOGIES #79

Energy
NUCLEAR
Nuclear power is complex, expensive, and risky, but it has the potential to avoid emissions from fossil fuel electricity. We consider it a "regrets solution."
16.09 GT REDUCED CO2 #20

Food
NUTRIENT MANAGEMENT
When overused, nitrogen fertilizers destroy soil organic matter, pollute waterways, and create nitrous oxide. They can be more efficiently managed to reduce these negative impacts.
1.81 GT REDUCED CO2 #65

Coming Attractions
OCEAN FARMING
Small-scale ocean farms have the potential to provide sustainable food and biofuel, while oysters filter nitrogen pollution and seaweed sequesters carbon dioxide.

or additional

#50

valuable fertilizer, averting methane emissions.

2.28 GT REDUCED CO2 #60

produce steam, and turn turbines.

10.90 GT REDUCED CO2 #25

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17.35 GT REDUCED CO2 #16

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10.80 GT REDUCED CO2 #26

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#23

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0.77 GT REDUCED CO2 #73

Transport

HIGH-SPEED RAIL

Materials

HOUSEHOLD RECYCLING

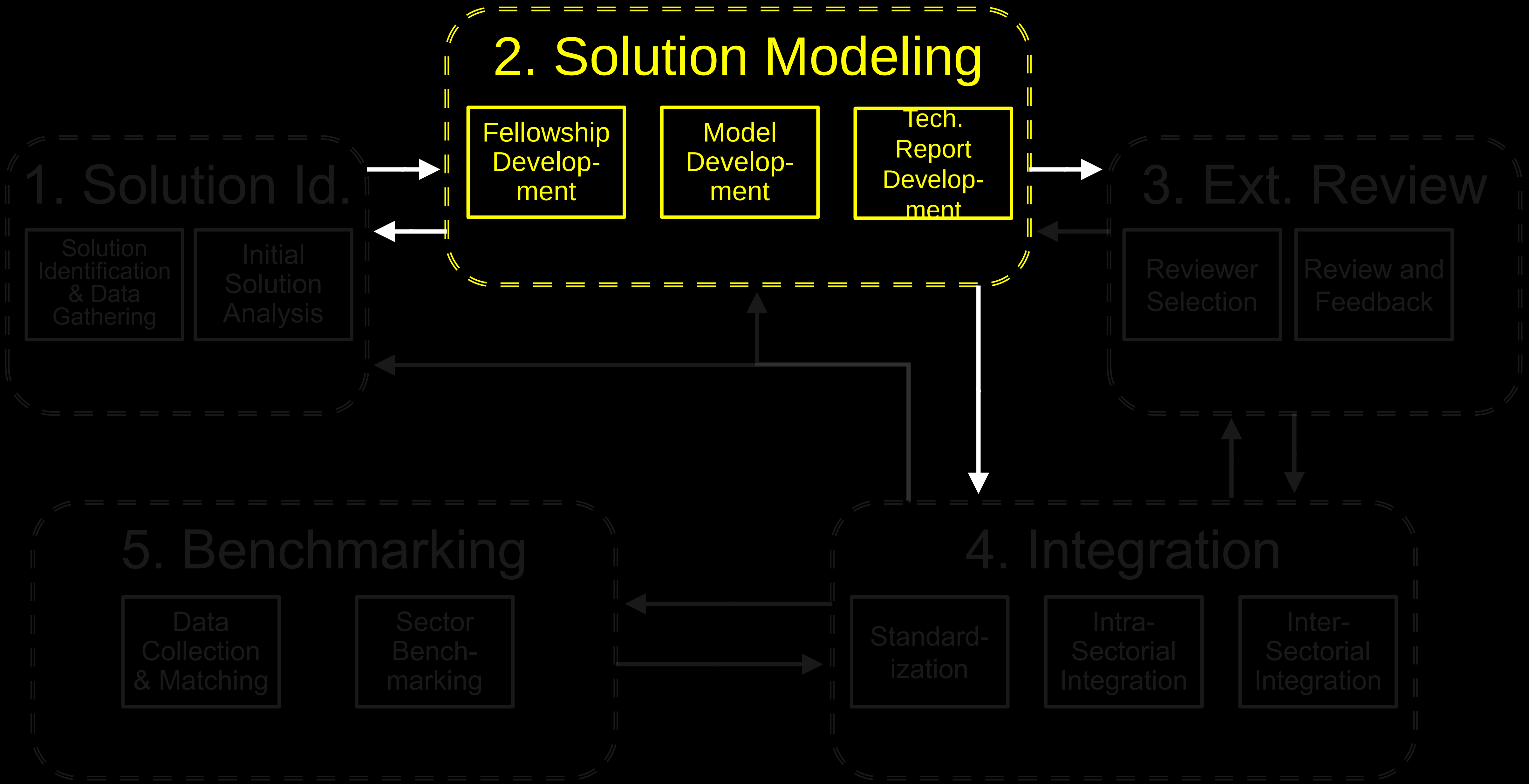
Coming Attractions

HYDROGEN-BORON FUSION

Coming Attractions

HYPERLOOP

The Modelling Process



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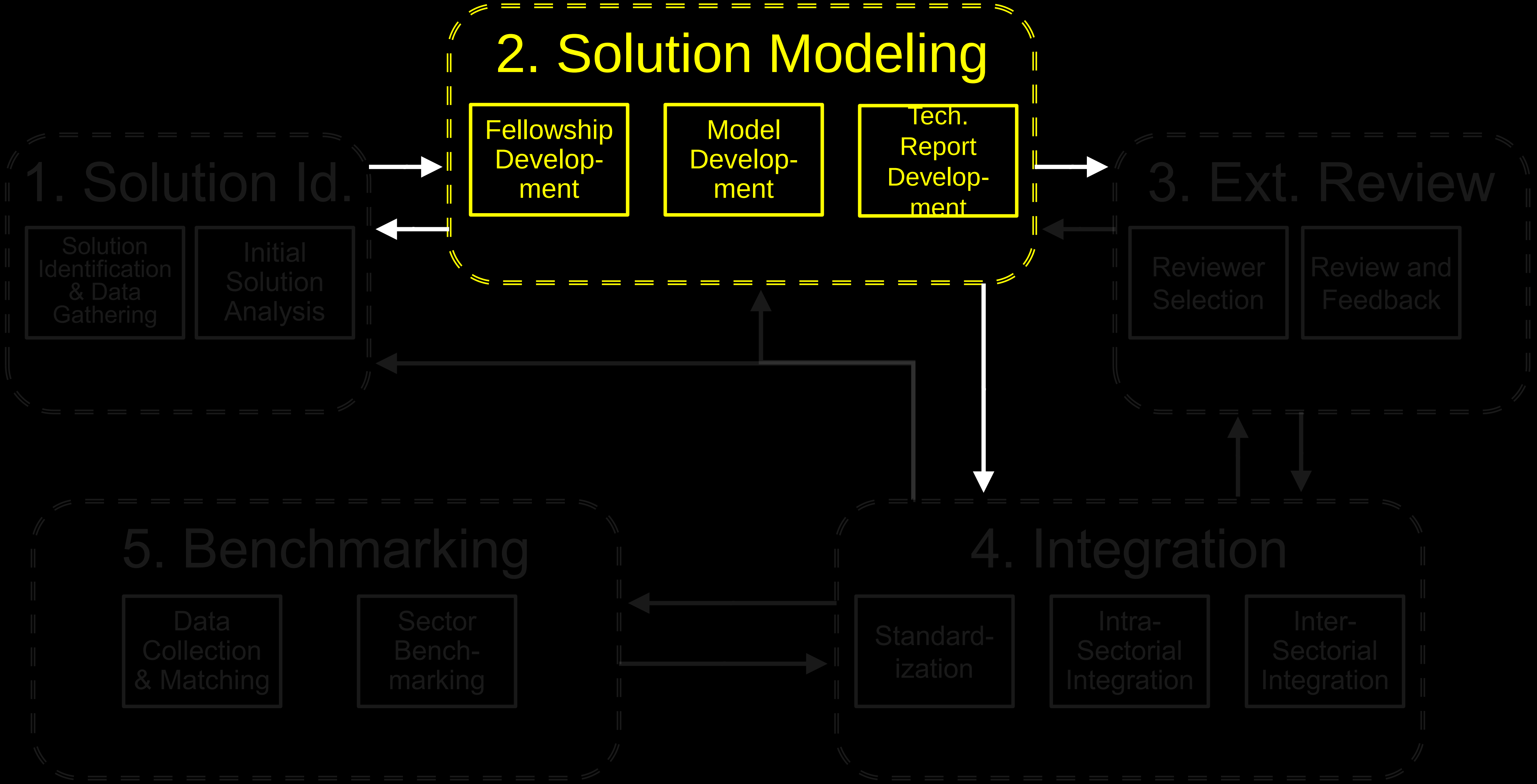


Modeling Overview

Models are:

- Excel-based
- Based on Meta-Analysis
- Bottom-up
- Multifunctional
- Consistent across Solutions

Level of Agency Assumed:

- Individuals and Households
- Cities and Communities
- Businesses and Industries
- Buildings and Facilities Owners
- Utilities
- Land Owners: Farms, forests and grasslands

Key Assumptions

1. Infrastructure required is already in place
2. Policies already in place
3. Carbon price isn’t modeled
4. Costs and savings are at agency level
5. Prices may change according to learning
6. Frozen technology development

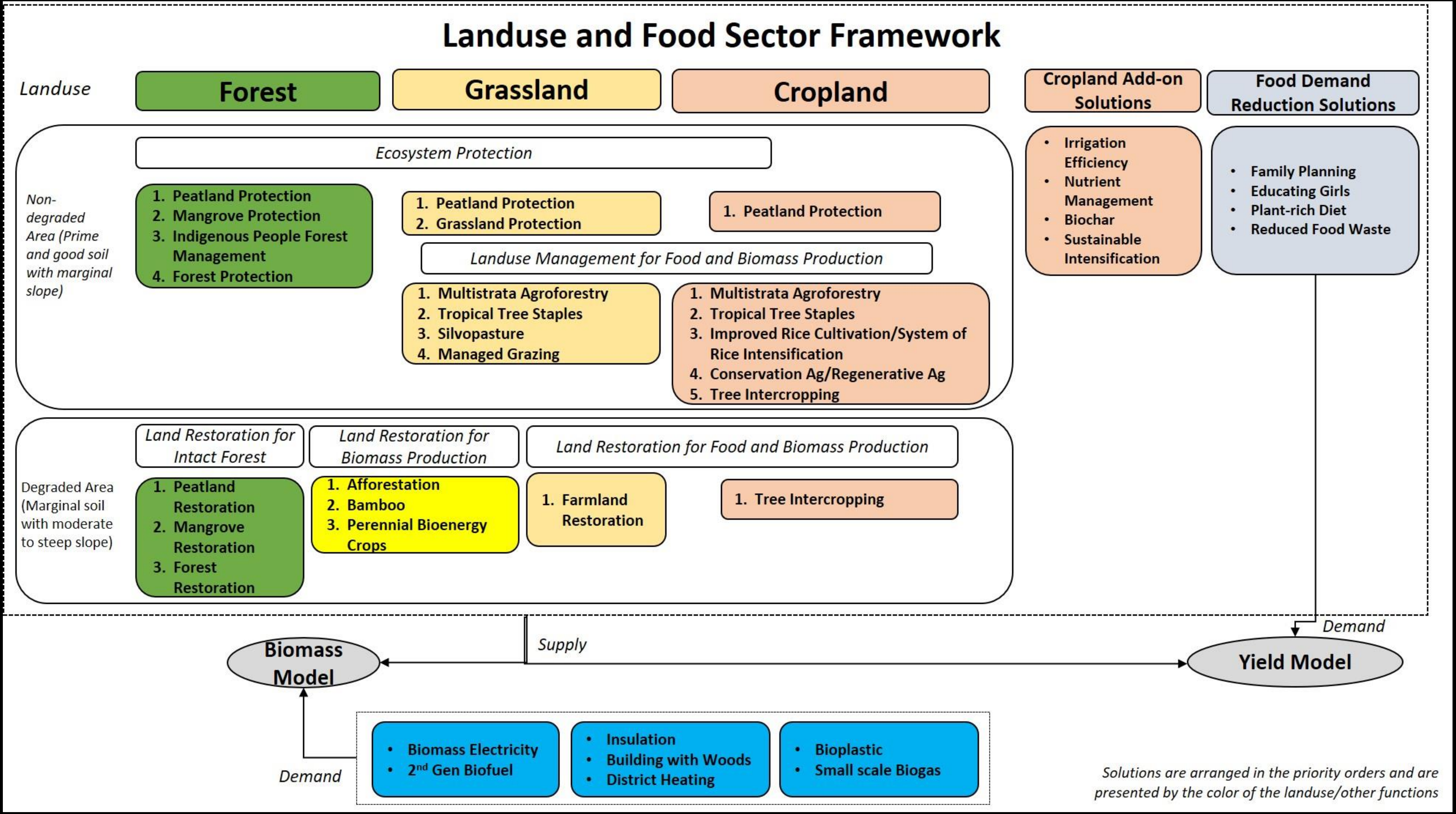
The Models

- **Reduction and Replacement Solutions (RRS) Model →** energy and energy efficiency solutions.

- **Land Use Solutions (LAND) Model →** land-based solutions with biosequestration potential.

- **Food System →** integrated supply-side solutions based on country-scale consumption patterns.

- Ocean Solutions Model → marine-based technologies & practices.



Landuse and Food Sector Framework
Landuse
Forest
Grassland
Cropland
Cropland Add-on Solutions
Food Demand Reduction Solutions
Ecosystem Protection
Non-degraded Area (Prime and good soil with marginal slope)
1. Peatland Protection
2. Mangrove Protection
3. Indigenous People Forest Management
4. Forest Protection
1. Peatland Protection
2. Grassland Protection
1. Peatland Protection
Landuse Management for Food and Biomass Production
1. Multistrata Agroforestry
2. Tropical Tree Staples
3. Silvopasture
4. Managed Grazing
1. Multistrata Agroforestry
2. Tropical Tree Staples
3. Improved Rice Cultivation/System of Rice Intensification
4. Conservation Ag/Regenerative Ag
5. Tree Intercropping
• Irrigation Efficiency
• Nutrient Management
• Biochar
• Sustainable Intensification
• Family Planning
• Educating Girls
• Plant-rich Diet
• Reduced Food Waste
Land Restoration for Intact Forest
Land Restoration for Biomass Production
Land Restoration for Food and Biomass Production
Degraded Area (Marginal soil with moderate to steep slope)
1. Peatland Restoration
2. Mangrove Restoration
3. Forest Restoration
1. Afforestation
2. Bamboo
3. Perennial Bioenergy Crops
1. Farmland Restoration
1. Tree Intercropping
Supply
Demand
Biomass Model
Yield Model
Demand
• Biomass Electricity
• 2nd Gen Biofuel
• Insulation
• Building with Woods
• District Heating
• Bioplastic
• Small scale Biogas
Solutions are arranged in the priority orders and are presented by the color of the landuse/other functions

Units that drive the model

- Functional Units
  - RRS: Markets of Demand
  - Land: Land Area
  - Food: Kcal per capita
  - Adoption
- Implementation Units

Variable Meta-Analysis

- Variable data collected from scientific literature
- Some Variables normalized *per* unit
- Variables weighted where necessary

Main Input Variables – RRS Models

- **Total Addressable Market**
- **Future adoption projections**

- **Financial Variables**
  - First Costs ($/kW)
  - Variable and Fixed Operation and Maintenance Costs ($/kWh)
  - Fuel prices
  - Discount Rates

- **Technical Variables**

  - Average Annual Use (hours)
  - Lifetime Capacity (years)
  - Learning rates (%)
  - Emissions factors Indirect Emissions (embodied) (tCO_2-eq/TWh)
  - Emissions factors Direct Emissions (tCO_2-eq/TWh)

Main Input Variables – Demand-side Food System

Total Addressable Market : estimated global food demand for human consumption, 2014-2060

Future adoption projections : % adoption of solution by 2050 (assumption-based)

Financial Variables : Are not evaluated in this study; data too variable

Technical Variables

- **Kilocalories / capita / day** for 95 different commodities available for human consumption, by country
- **Current diet:** based on estimated consumption patterns from 2011-2013
- **Current loss and waste pattern:** based on FAO estimates across supply chain by region
- **Future food demand forecast** estimated by regional growth rates
- **Emissions factors** from LCAs based on commodity types (kgCO_2-eq/kcal)

The Scenarios

Compare a reference (REF) scenario (current adoption relatively constant)

~ with ~

an high adoption scenario (reasonably vigorous global adoption).

Two high adoption scenarios were developed, many more possible:

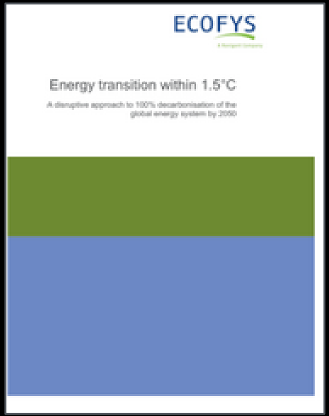
1. Scenario 1

2. Scenario 2

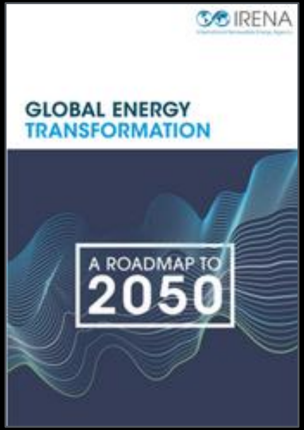
Global Adoption Cases

Electricity generation (in TWh) - 2019

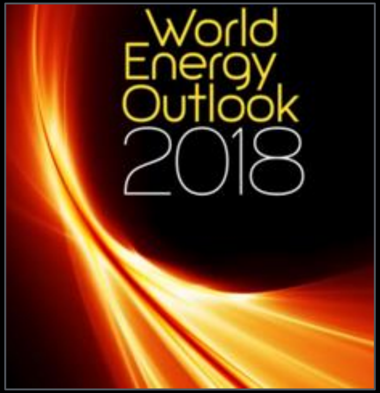
2018



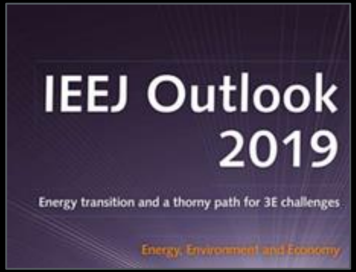
2018



2018

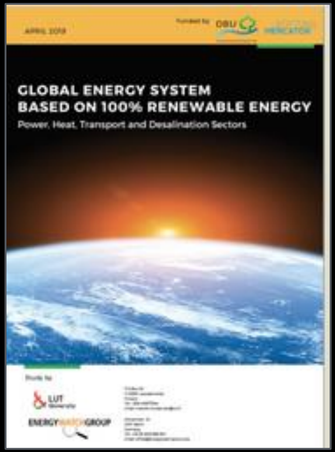


2019

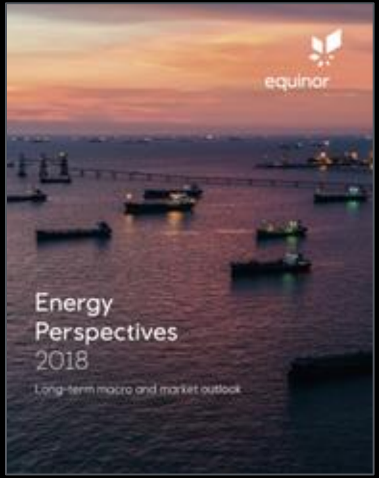


2017

2019



2018



GHG Accounting

- Direct (Operational) Emissions
- Indirect (Embodied) Emissions
- CO2-eq sequestered
- Total Carbon Sink

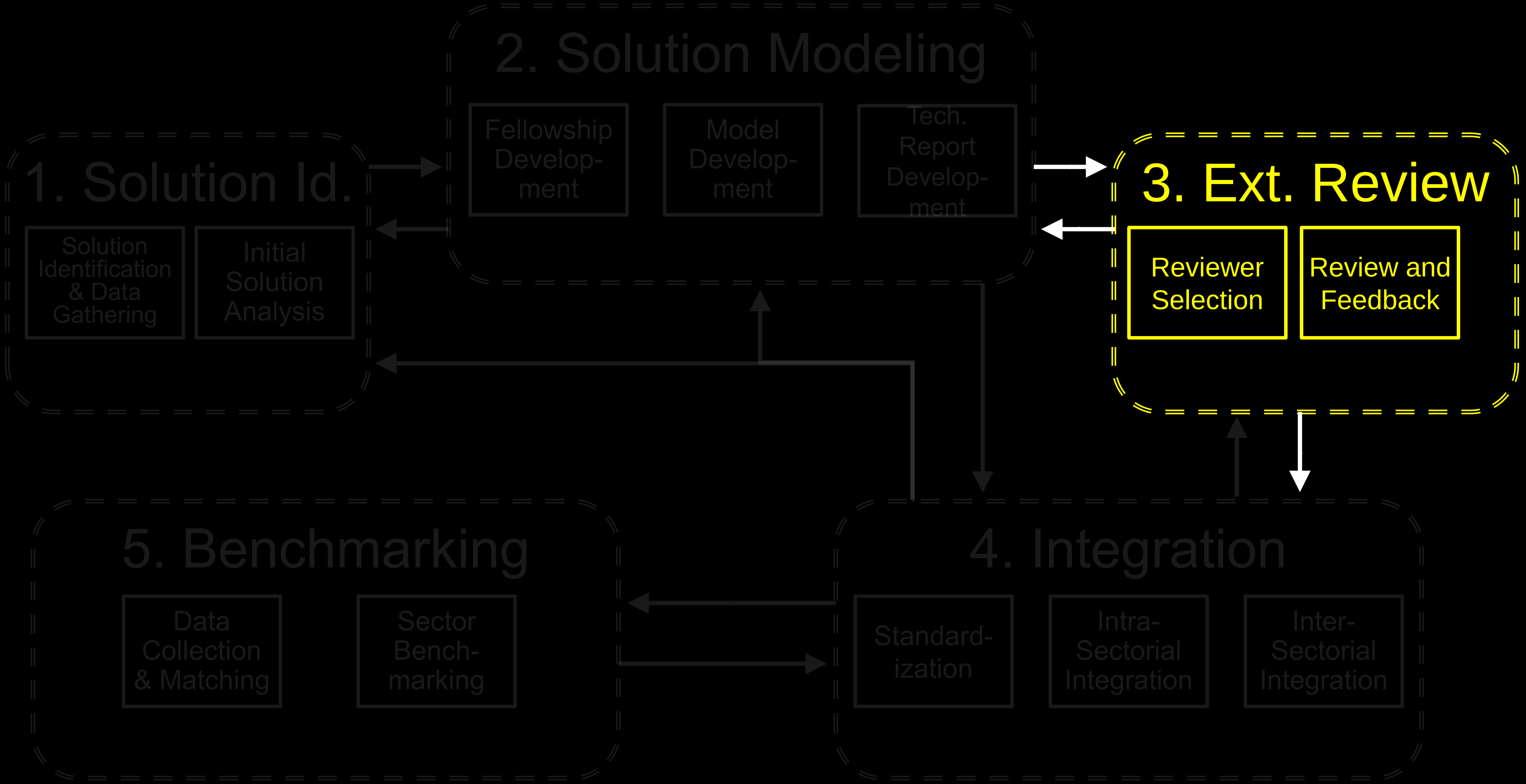
Financial Accounting

- Agency Level Important – agency costs only
- First (Implementation) Costs
- Operating Costs

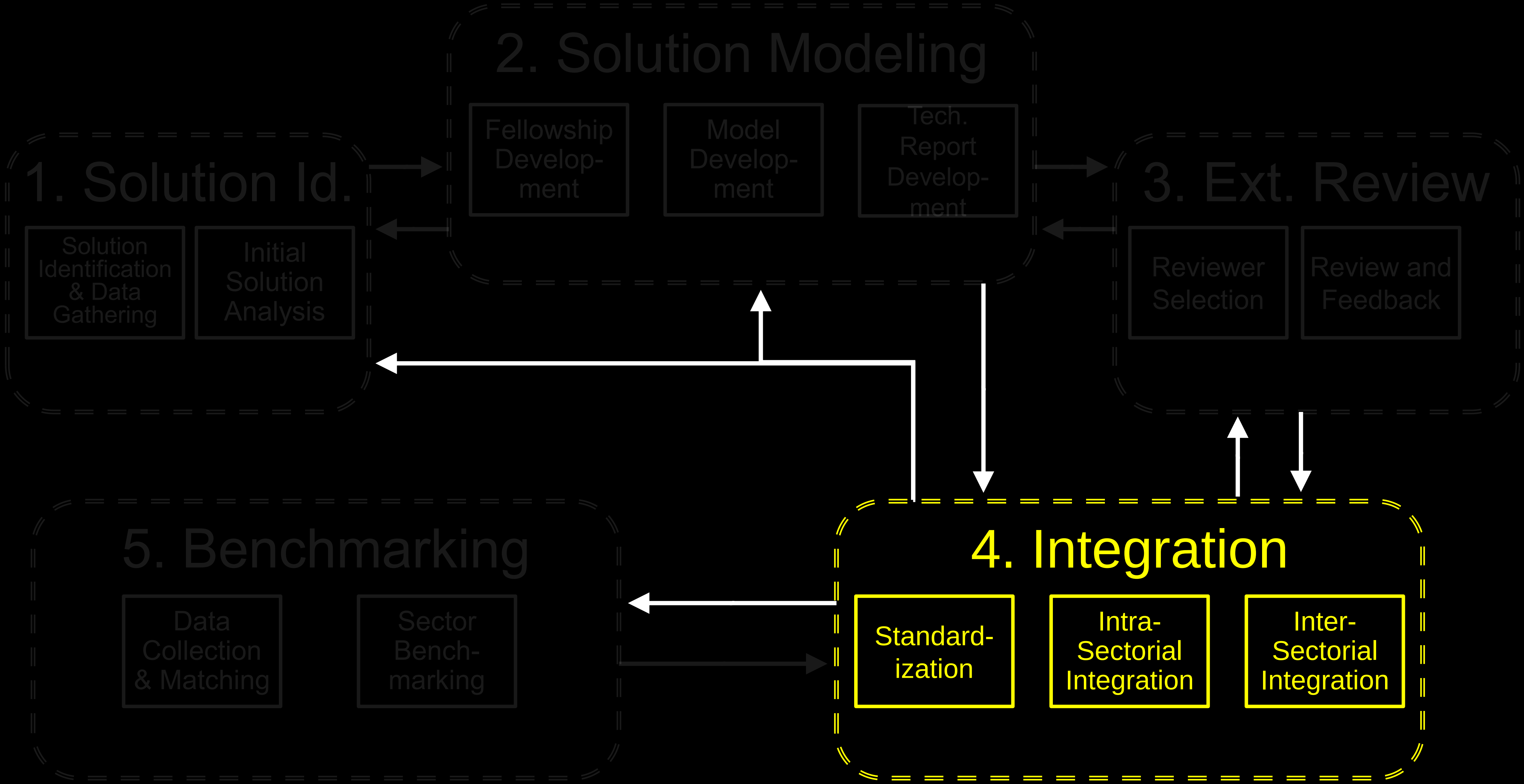
The Outputs

- Emissions Reduction (and Sequestration for Land Solutions)
- Net First Cost
- Net Operating Cost or Savings
- Payback Periods
- Abatement Costs
- Other Specialized Outputs

The Modelling Process



The Modelling Process



Integrating Solutions

Solutions exist within systems that have to account for:

- Avoiding double counting
- Market Alignment & Land Allocation
- Stock and flow relationships

The Integration Process: Standardization

1. Standard Core Models for Solutions (RRS and Land models)
    - Common Format and Structure
    - Common Functional and Implementation Units

2. Common Data Defined, e.g.
    - Grid and Fuel Emissions Factors and Prices
    - Conventional Technology Adoptions

3. Common Tools, e.g.
    - Interpolation
    - Weighting of Data

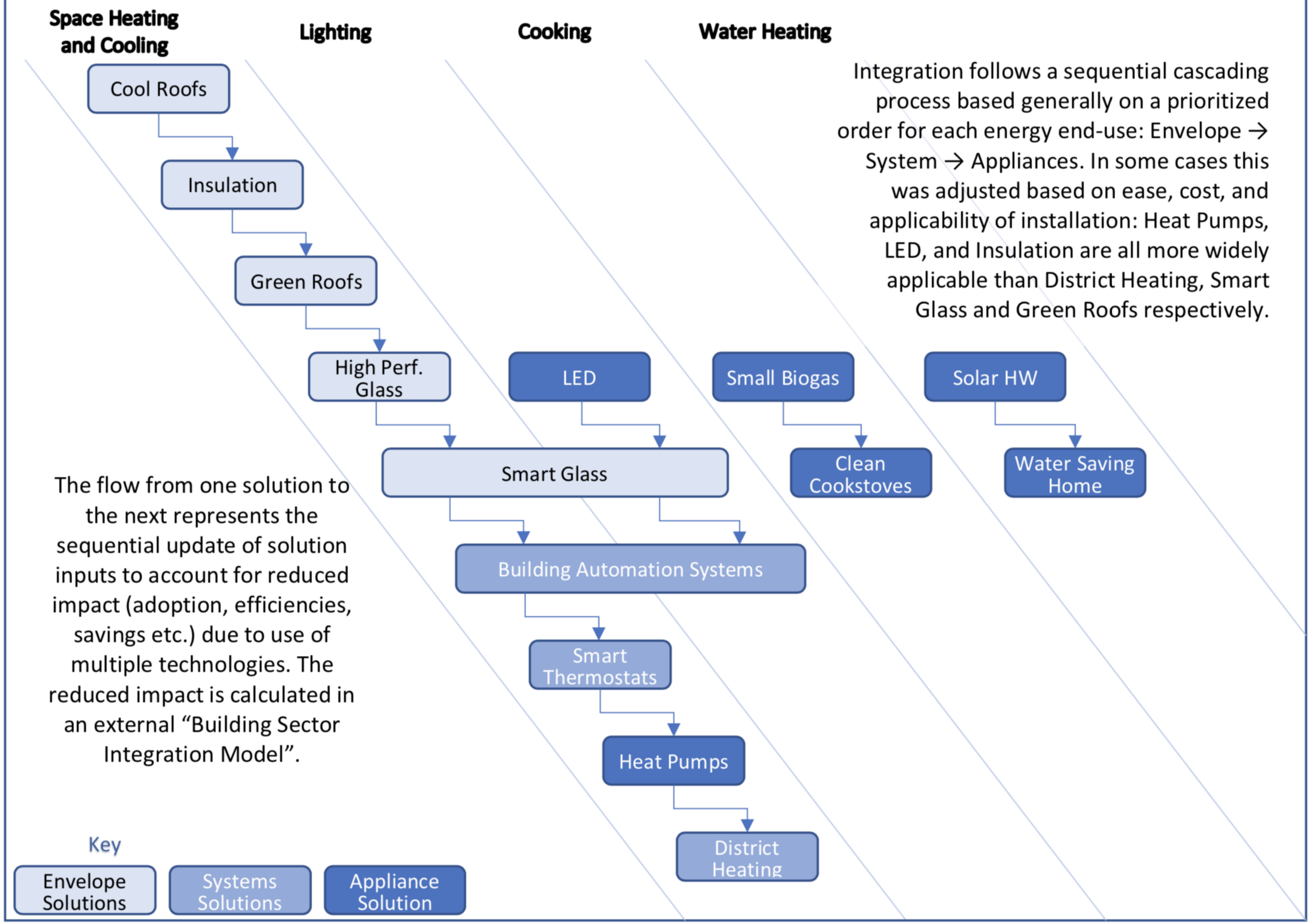
The Integration Process: Intra-Sectorial

1. Clusters (e.g. Urban vs. Freight Transportation; Agriculture vs. Livestock Management)
   - Developed within Each Sector for Closely Related Solutions
   - Share Markets, Conventional Technology and Key Variables

2. Double Counting (e.g. Building Integration)
   - Biggest Overlaps Quantified
   - Custom Approaches Used

3. Stock and Flow Relationships (e.g. Waste and Biomass)
   - Delimiting System Boundaries
   - Prioritization of Flows

Project Drawdown Buildings Integration Process



Integration follows a sequential cascading process based generally on a prioritized order for each energy end-use: Envelope → System → Appliances. In some cases this was adjusted based on ease, cost, and applicability of installation: Heat Pumps, LED, and Insulation are all more widely applicable than District Heating, Smart Glass and Green Roofs respectively.

The flow from one solution to the next represents the sequential update of solution inputs to account for reduced impact (adoption, efficiencies, savings etc.) due to use of multiple technologies. The reduced impact is calculated in an external "Building Sector Integration Model".

The Integration Process: Inter-Sectorial

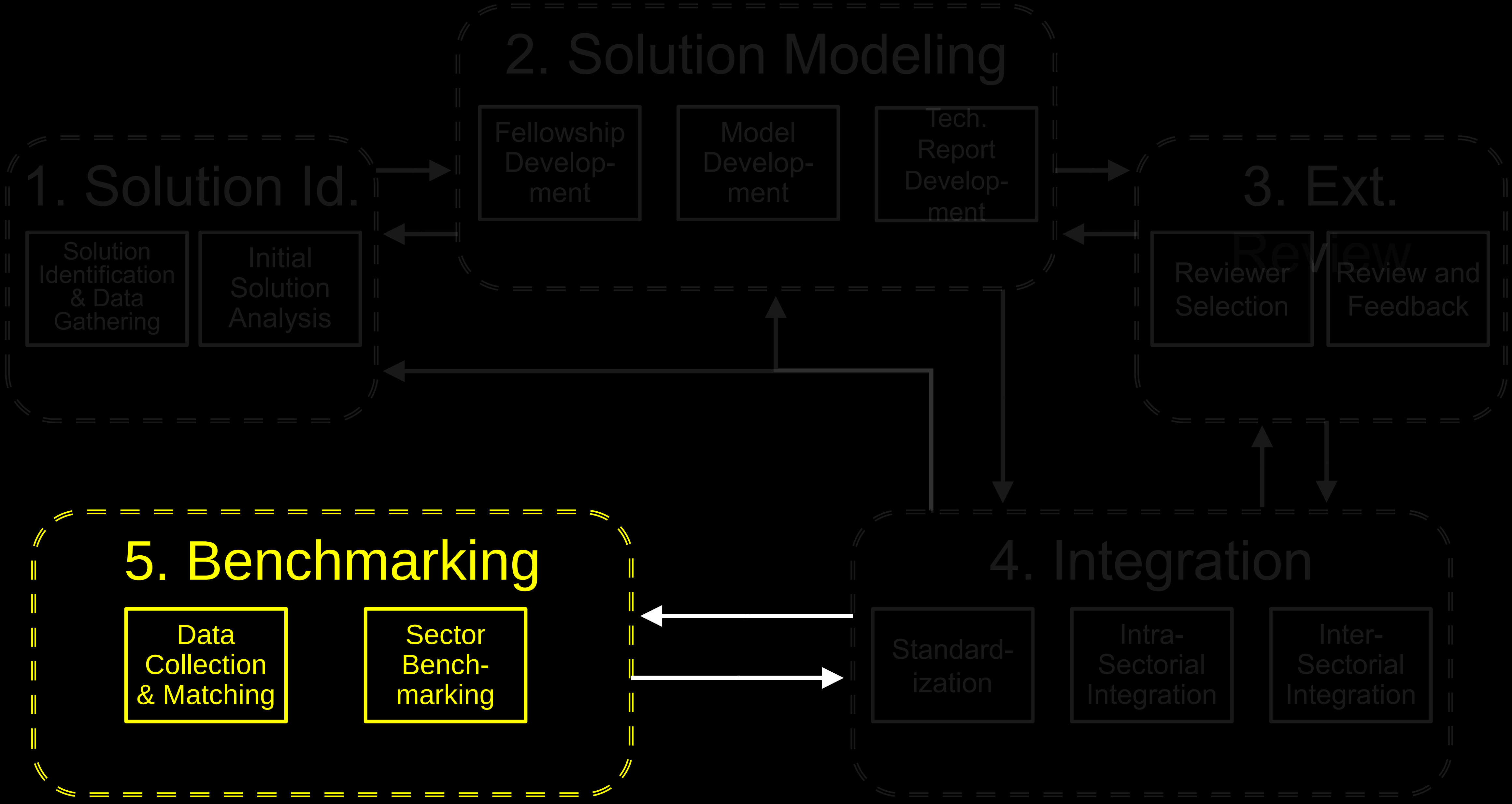
1. Identification and Integration of Major Interaction, e.g.:
    - Electricity Grid ⇄ Electrification and Efficiency Solutions
    - Waste Generation ⇄ Waste Management ⇄ Waste Usage
2. Example: Electricity Grid
    - Match New Grid Demand (if any)
    - Remove Emissions Double Counting
3. Example: Waste
    - Identify, Classify and Quantify Streams (Organic etc.)
    - Prioritize and Set Stock Limits

Prioritization

1. Human rights / Equity / Social Justice / Empowerment
2. Total emissions reduction and/or sequestration
3. Abatement cost/savings (i.e. cost/savings per ton CO_2-eq)
4. Limited Feasibility (i.e. solutions that have limited physical boundaries, material limits, resource potential)
5. Implementation requirements: policy, infrastructure, finance, behavior

Many Mitigation Solutions also Have Adaptation and Development Benefits

The Modelling Process



Limitations

- Sensitivity Analysis is not easily done currently
- Model does not allow overlap
- Few interaction effects accounted for
- No rebound effects
- Requires qualitative analysis of solutions

Future Developments

- Python version to automate model
  - e.g. sensitivity analysis, scenario analysis
- New Reference Scenarios will be created
- Climate impact of emissions reductions to be added
  - i.e. expected temperature changes
- Climate change feedbacks to be included in the system
  - e.g. Some vulnerability to be modelled

Moving from
What if ? → *How to ?*

1. Collect More and Better Data

2. Improve Modeling/Integration of Solutions and Sectors

3. Distribute Modeling

- Develop Collaborative Drawdown Platform
- Regionalize/Contextualize Models and Approaches
- Incorporate levers of action and accelerators

MODELLING

DRAWDOWN

Ryan Allard, PhD; ryan.allard@drawdown.org

Senior Fellow, Transport and the Built Environment, **Project Drawdown**