

Climate impacts of sustainable growth strategies

The various sustainable growth strategies considered have a wide range of climate impact per job added. At the low end, the business services strategy has a low impact of roughly 1 ton of CO₂ per job per year, mostly from the energy use in office buildings. Cleantech jobs that center on software development will have a similar profile. Advanced manufacturing businesses that focus on producing fabricated or electronic components or products produce roughly 5-10 tons of CO₂ per job per year. These higher emissions are due primarily to the electric power needed for equipment. Cleantech jobs such as solar panel assembly, battery assembly or power electronics manufacturing will have emissions in this range. Strategies such as Clean Supply Chains and some forms of Advanced Manufacturing have emissions in the 20-40 tons/job/year range. In both cases, these emissions are largely driven by fuel use - by transportation vehicles in the case of Clean Supply Chains, and by high temperature processes in the case of manufacturing plastics and rubber components, food and beverage products, and foundries.

Manufacturing of primary materials, such as iron or steel, cement, aluminum, and chemicals is associated with much higher emissions, 200 or more tons/job/year, in some cases much more. These emissions come from a combination of high fuel use required for very high temperature processes and emissions that are inherent to the material itself.

All growth strategies considered have pathways to reduce the emissions per job and eventually reach zero emissions in the future, but those pathways depend on the current source of emissions. Office-based jobs and manufacturing jobs that use electricity for power will decline in carbon intensity as renewable energy supplies a greater percentage of the electrical grid. Industries that use fuel for transportation or process heat will have to shift to electric heat sources and transportation, both of which are in early stages of expansion. Clean Supply Chains businesses have the potential to offset some emissions by using their large roof area to host solar generation resources as well. Finally, high emissions materials industries will require new technologies for decarbonization, such as hydrogen-based iron and steel production, carbon capture and sequestration, or other new approaches. In many cases, early examples of these technologies exist, but may currently be only at the pilot plant or demonstration level.

Other environmental risks of sustainable growth strategies

Advanced manufacturing, Clean Supply Chains and Cleantech businesses can pose additional risks of environmental harm, however these industries include a wide range of very different activities. As a group, they all have risks of air, water and solid waste pollution, but individual businesses may be safe in one or more of these areas due to good pollution prevention practices, the nature of their business or both.

In general, businesses have a variety of strategies available to reduce their environmental impact. The air pollution risks differ depending on the manufacturing type, but mitigation strategies broadly include identifying alternate materials, changing processes to capture and recycle pollutants instead of releasing them, and treating plant exhaust to burn or neutralize

pollutants. Water pollution is similarly managed through a combination of material selection, process modification and onsite water treatment. Solid waste pollutants are managed through recycling where possible, as well as incineration for energy recovery.

Businesses within a manufacturing category have widely varying pollution profiles depending on their specific processes, mitigation strategies and level of corporate responsibility. Maintaining a low pollution risk for the community requires identifying good operators, mandating good practices and monitoring behavior. State and federal regulatory frameworks already support these efforts.