Economic Implications of a Permit "Pause"

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American® Chemistry Council

Background

The Break Free from Plastics Pollution Act proposes to "pause" for three to five years[1] the issuance of permits to facilities that manufacture plastic resins, ethylene and propylene from natural gas liquids, and advanced recycling facilities. The CLEAN Future Act contains a similar proposal. ACC expects the permit "pause" will curtail 100% of new capacity expected to come online, in addition to a share of existing production at facilities that are unable to continue operations due to the inability to get permits for required maintenance and other permit-triggering activities. Impacts of this pause are widespread. Ethylene and propylene represent a large fraction of total chemical building blocks (also known as feedstocks) used to produce thousands of different chemicals in addition to plastics (See Appendix), including plastics used in personal care products such as diapers, medical applications such as syringes, N95 masks, lightweight polymers and composites for fuel efficient vehicles and electric vehicle batteries and solar panels and wind turbines. Several additional upstream and downstream chemistries will be negatively impacted, including other petrochemicals used in plastic resin production, certain organic intermediates used in resins or downstream from the reduced supply of ethylene and propylene, and inorganic chemicals used in plastic resins. In addition, complementary production of plastic additives and plastic compounding will be negatively affected.

[1] The pause is in effect while EPA completes a rulemaking. The Clean Future Act calls for this to be done in 3 years but legislative deadlines on rulemakings are seldom met.

Executive Summary

To explore the range of potential economic impacts, two scenarios were considered. Scenario 1 assumes 100% of production from new facilities after 2021 is lost, in addition to 10% per year of existing capacity from the inability of existing facilities to get needed permits for continued operations. Scenario 2 also assumes 100% of production lost from new facilities and 20% per year decline in production at existing facilities. Impacts for both a three-year (ending in 2024) and five-year (ending in 2026) pause were modeled for each scenario.

The analysis showed that, at minimum (Scenario 1 with a three-year pause), production reductions could total $64 billion (in constant 2020 dollars) of lost chemical and resin output and result in direct chemical industry job losses of 39,400 in 2024. Through indirect supply chain effects, an additional 152,000 jobs would be at risk. Finally, payroll-induced effects supported by the wage-supported household spending of direct and indirect workers remove support for another 134,800 jobs. All of these figures would rise significantly if the pause extended to five years.

If the impacts were aligned with Scenario 2, direct chemical and resin output losses could total $179 billion (in constant 2020 dollars) with a five-year pause, with as many as 107,000 direct chemical industry jobs lost. Through indirect supply chain effects, another 427,900 jobs could be at risk. Finally, payroll-induced effects supported by the payroll spending of direct and indirect workers remove support for another 375,400 jobs. All told, 910,300 jobs could be at risk in 2026 under Scenario 2.

While this analysis only looks at impacts in 2024 and 2026 (after a three- or five-year pause, respectively), it is unlikely that production would quickly return to "pre-pause" levels following the end of the "pause". In the intervening years, customer industries will have shifted supply chains abroad. As a result, a share of the economic impacts presented in this report, including job losses, could become permanent. In addition there would be widespread trade impacts. The U.S. would go from being a net exporter of plastic resins to a large net importer. This trade impact would make the U.S. dependent on other countries, likely China and those in the Middle East, for a wide range of critical chemicals and plastics including plastics used in medical applications such as syringes, N95 masks, lightweight polymers and composites for fuel efficient vehicles and electric vehicle batteries and solar panels and wind turbines.

Note: this analysis does not capture the impact related to the potentially large advanced recycling industry that is currently in its infancy and also subject to a pause. With $4.8 billion in announced capacity additions, the potential for this industry to grow is considerable.[2] A 2019 ACC analysis projects that if 25% of non-recycled plastics were used for advanced recycling, the economic associated economic activity would support 38,500 jobs throughout the economy.[3]

[2] Based on data collected from public sources and ACC estimates, nearly $5.7 billion of investment in modern recycling have been announced since 2017, including nearly $0.9 billion for mechanical recycling and $4.8 billion for advanced recycling.

[3] https://plastics.americanchemistry.com/Economic-Impact-of-Advanced-Plastics-Recycling-and-Recovery-Facilities-in-the-US.pdf?__taxonomyid=254#:~:text=%242.2%20billion%20in%20annual%20payrolls.&text=%249.9%20billion%20in%20U.S.%20economic,supplier%20and%20payroll%2Dinduced%20impacts.

Chemicals and Resins Impacted by the Break Free and CLEAN Future Act

The Break Free From Plastic Pollution Act and CLEAN Future Act propose to pause permits for facilities that produce:

- plastic resins,
- ethylene and propylene made from natural gas liquids (NGLs), and
- plastic resins and/or feedstocks developed from advanced recycling technologies, such as pyrolysis.

Due to the development of shale gas over the past decade and the competitive advantage of abundant NGLs, nearly all U.S. produced ethylene is now derived from NGL feedstocks. In addition, half of U.S. propylene production is based on NGLs with refinery streams contributing the balance. The development of shale gas and accompanying abundance of NGLs significantly enhanced the global competitiveness of U.S. chemicals and resins. The U.S. went from being among the highest cost producers of ethylene in 2005 to one of the lowest by 2019. This improved cost position has motivated an expansion of the U.S. industrial base, including additional chemical and resin capacity.

The impact of the permit pause, however, is not confined to the segments directly targeted in the proposal. Because of the interconnected nature of chemical production, several other chemistries would be indirectly impacted either due to reduced demand from plastic resin manufacturing and/or supply constraints related to reduced ethylene and propylene production, including:

- **Other Petrochemicals** - Beyond ethylene and propylene, several petrochemical building block chemicals are used in resin manufacturing. Lower resin production would result in lower demand for these petrochemicals. One example is butadiene which is used in acrylonitrile butadiene styrene (ABS) resins used to produce the hard plastic housing for computers and some appliances.
- **Organic Intermediates** - For many plastic resins, there are intermediate organic chemicals that are produced between petrochemicals and plastic resins. Many of these organic intermediates have uses beyond plastic resin production. Lower resin production would result in lower demand for these organic intermediates. One example is styrene which is used in polystyrene resins used to produce insulation and electrical connectors. In addition, production of some organic intermediates would be negatively affected due to lower supply of ethylene and propylene that is not met by refinery supply or imports. One example is detergent alcohols made from ethylene.
- **Inorganic Chemicals** - Several plastic resins include inorganic compounds in their structure. Lower resin production would result in lower demand for these inorganic chemicals. One example is chlorine used in polyvinyl chloride (PVC) used for plastic pipe and vinyl siding.
- **Plastic Additives** – Raw plastic resins are usually combined with additives that impart specific performance characteristics. These additives include colorants, UV stabilizers, heat stabilizers, plasticizers, processing agents, etc. Reduced production of plastic resins not met through imports will reduce production of plastic additives.
- **Plastic Compounding** - Compounders mix raw plastic resins with additives to produce custom blends of resins with specific properties for customers. Reduced production of plastic resins not met through imports will reduce plastic compounding.

Further downstream, many of the affected organic intermediates are used to produce a broad portfolio of specialty chemistry. Segments affected would include paints and coatings, safety glass, adhesives, non-wovens used in personal protective equipment (PPE), paper coatings, detergents, lubricants, solvents, inks, lube oil and other performance additives, wastewater treatment chemicals, among others. It would also affect downstream chemistry in other product chains/families including other adhesives and coatings, rubber processing chemicals, and other performance chemistry. Alternative supplies of these intermediates would need to be imported to prevent further erosion of this important segment of the U.S. industrial base.

In addition to the lost value of output from plants closed due to the permit pause, any projects currently under construction would have to be abandoned. The cost of cancelling these projects would be significant, but difficult to estimate, and are not included in this analysis.

Impact on Chemical and Resin Production

This analysis assumes that 2022 is the first year that production of resins and chemicals will be impacted, and production is capped at 2021 levels. A three-year pause will impact production in 2022, 2023, and 2024. A five-year pause will impact production through 2026.

Data on current shipment (dollar value of output) levels for each of the groups of chemicals and resins impacted was developed from Census Bureau data and ACC estimates. These were projected out to 2026 based on estimates of the growth in physical production volumes from the ICIS Supply & Demand database. Shipments are presented in constant dollars ($2020) and do not include the impact of changing price levels. Table 1 shows the shipment values for the groups of chemicals impacted.

Table 1 Chemicals and Resins Impacted ($2020 billions)

Existing Capacity Capped at 2021 ↓ | Includes Growth from New Capacity Additions →

	2019	2020	2021	2022	2023	2024	2025	2026
Plastic Resins	$81.7	$81.2	$82.7	$87.3	$89.6	$91.1	$92.3	$93.4
Ethylene and Propylene	$21.8	$23.1	$24.0	$25.7	$26.8	$27.1	$27.5	$28.1
Plastic Additives	$5.2	$4.7	$4.8	$5.1	$5.2	$5.3	$5.4	$5.5
Plastics Compounding	$10.5	$10.1	$10.2	$10.8	$11.1	$11.3	$11.4	$11.6
Other Petrochemicals	$5.2	$5.2	$5.9	$6.0	$6.2	$6.7	$6.9	$7.0
Organic Intermediates	$27.8	$26.4	$27.7	$28.4	$29.4	$30.1	$30.6	$31.2
Inorganic Chemicals	$2.0	$2.0	$2.0	$2.1	$2.1	$2.2	$2.2	$2.3
Total	**$154.2**	**$152.6**	**$157.3**	**$165.4**	**$170.4**	**$173.9**	**$176.4**	**$179.1**

There are two streams of production that are affected: new production expected to come online beginning in 2022 (when the law is assumed to take effect) and production from existing facilities unable to get permits needed for ongoing operations. While much of the surge in shale-advantaged new capacity has already come online in recent years, additional new capacity expected to come online through 2026. This analysis starts with the fact that 100% of expected production and employment from new capacity additions will be curtailed due to the permit pause. In addition, large amounts of production from existing capacity will also be curtailed. Production from existing facilities will be curtailed as those facilities are unable to obtain permits for maintenance and other permit-triggering activities, including periodic required renewal.

Although legal aspects of the permit pause are complicated[4], we conservatively estimate that 10-20% of existing facilities making ethylene or propylene and plastic resin would be unable to get a permit

[4] Specifically, the temporary pause language would prevent the EPA Administrator from issuing any new permits to covered facilities where the Agency is the permitting authority and would require that the Administrator object under Title V to any new permit issued by a state. As drafted the scope of the Title V objection provision

each year and would be shut down until EPA finalized new permitting regulations required under the act. Thus, this study evaluates two conservative scenarios. In Scenario 1, 100% of production from new facilities after 2021 is lost, in addition to 10% per year of existing capacity from the inability of existing facilities to get needed permits for continued operations. Scenario 2 also models 100% of production lost from new facilities and includes a 20% per year decline in production at existing facilities. The share of production from existing facilities that are unable to continue operations due to the inability to get permits is cumulative. For example, in Scenario 1, the 10% per year reduction in production from existing facilities grows to 30% by 2024 and 50% by 2026.

could require that the Administrator issue objections to most, if not all, Title V permits, potentially even where there are only minor changes to the permit. This is especially the case where the Title V permit incorporates the requirements of a new state issued permit, be it a standard permit or a permit by rule. The requirement to object applies whether the permit is tied to production expansion, pollution control, or necessary maintenance as the provision provides that the Administrator is to object to any new permit. This may be the case even if the permit is not directly tied to the facility's production of a covered product. Once an objection is issued, there is no clear path to obtain a valid operating permit as there is no mechanism for the state to resolve the Administrator's objection and the Administrator is prohibited by the CFA from issuing the permit. Under Title V, a major source may not operate without a valid Title V permit.

Potential Lost Economic Activity Due to Permit Pause

The value of lost chemical and resin production in 2024 ranges from $64 billion in Scenario 1 to $111 billion in Scenario 2. By 2026, the impact grows to $100 billion in Scenario 1 to $179 billion in Scenario 2. The removal of this significant economic activity has a ripple effect, in terms of jobs, payrolls, and lost economic output in other segments of the economy tied to the production of these chemicals and resins. To estimate these broader economic impacts, several models were constructed in IMPLAN, a modeling system that employs industry spending patterns and output-to-labor ratios to estimate the full economic impact. Starting with the direct value of output lost, IMPLAN calculates three effects:

Direct - Jobs and wages generated from the manufacturing of chemicals and plastic resins.

Indirect (Supply Chain) - Jobs, wages, and output supported by the businesses in the supply chain that sell goods and services to insulation manufacturers (and their suppliers)

Payroll-Induced - Jobs, wages, and output supported by the household spending of wages and salaries of direct and indirect employees.

Using the IMPLAN model, the analysis showed that between 39,400 and 69,000 direct chemical and plastic resin manufacturing jobs will be lost in 2024. By 2026, those job losses expand to between 59,700 and 107,000. Many of these direct jobs are in Texas and Louisiana where much of the industry is concentrated. Indirect jobs throughout the supply chain are also at risk – between 152,000 and 264,800 in 2024 and between 240,000 and 427,900 in 2026. In addition, jobs supported in local communities and beyond by the household spending powered by the payrolls generated by workers could be jeopardized. These payroll-induced jobs range from 134,800 to 234,700 in 2024 and 210,500 to 375,400 in 2026. At the end of the day, a total of between 326,200 and 568,500 jobs are at risk in 2024 and 510,200 to 910,300 jobs are at risk in 2026. Tables 2 presents the economic impacts in both scenarios for 2024. Table 3 presents the results for 2026.

Table 2 – Upstream Economic Impacts in 2024 (3-year pause)

Scenario 1

	Jobs	Payroll ($2020 B)	Output ($2020 B)
Direct	39,400	$4	$64
Indirect	152,000	$13	$59
Payroll-Induced	134,800	$8	$25
Total	**326,200**	**$24**	**$148**

Scenario 2

	Jobs	Payroll ($2020 B)	Output ($2020 B)
Direct	69,000	$7	$111
Indirect	264,800	$22	$102
Payroll-Induced	234,700	$14	$43
Total	**568,500**	**$42**	**$256**

Table 3 - Upstream Economic Impacts in 2026 (5-year pause)

Scenario 1

	Jobs	Payroll ($2020 B)	Output ($2020 B)
Direct	59,700	$6	$100
Indirect	240,000	$20	$93
Payroll-Induced	210,500	$12	$39
Total	**510,200**	**$38**	**$232**

Scenario 2

	Jobs	Payroll ($2020 B)	Output ($2020 B)
Direct	107,000	$10	$179
Indirect	427,900	$35	$165
Payroll-Induced	375,400	$22	$69
Total	**910,300**	**$67**	**$413**

Impact on Downstream Industries

In addition to the direct impact on chemical and resin production and upstream impact on suppliers and businesses supported by payrolls, there are potentially significant impacts on downstream customer industries, including plastic products and the industries that use plastic products.

The plastic products industry (converters and fabricators) produced $201 billion in output and employed nearly 600,000 in 2020. This captures only a portion of manufacturing activity to make plastic products, however. Many other industries directly consume plastic resins that are used to produce plastic goods, such as car parts, construction materials, furniture, food packaging, medical supplies, etc.

If cost-advantaged domestic supplies of resin become unavailable, these downstream customers will be required to import resin, likely from the Middle East or China. If resin imports are not a competitive option, their customers may have to source fabricated plastic products from outside the U.S., losing even more economic activity (and jobs) to competitors, such as China who would be in the best position to fill the gap. Further eroding the U.S. industrial base, the loss of competitiveness in plastic products could manifest in additional outsourcing of industrial and consumer product manufacturing that use plastic products as inputs.

While the analysis does not extend beyond 2026 when new regulations are promulgated, the reality is that there will be a lasting impact not only on chemical and resin production, but in some downstream customer industries. Whether over three or five years, downstream customers will have shifted supply chains toward foreign producers, permanently offshoring U.S. manufacturing jobs and expanding the trade deficit.

Methodology and Description of Data Sources

The IMPLAN model is an input-output model based on a social accounting matrix that incorporates all flows within an economy. The IMPLAN model includes detailed flow information for 546 industries.[5] As a result, it is possible to estimate the upstream economic impact of a change in final demand for an industry at a relatively fine level of granularity. For a single change in final demand (i.e., change in industry spending), IMPLAN can generate estimates of the direct, indirect and induced economic impacts. Direct impacts refer to the response of the economy to the change in the final demand of a given industry to those directly involved in the activity. Indirect impacts (or supplier impacts) refer to the response of the economy to the change in the final demand of the industries that are dependent on the direct spending industries for their input. Induced impacts refer to the response of the economy to changes in household spending as a result of payrolls generated in the direct and indirect effects.

Data on direct employment was estimated using the 2019 IMPLAN model and direct payrolls were estimated using average annual pay from the Bureau of Labor Statistics.

A system of industry spending pattern activities was developed in IMPLAN to model the impact of lost output in each year. To avoid double counting, each industry spending pattern was modified to eliminate indirect impacts that are included as direct impacts elsewhere. For example, the indirect (supply chain) impact from purchases of petrochemicals by the plastic resins industry were excluded, as those impacts are directly modeled elsewhere.

Underlying data on the value of shipments (i.e., output value) is based on the Census Bureau's Annual Survey of Manufacturers (2019) and the ACC Guide to the Business of Chemistry with data projected forward through 2026 using changes in physical production of groups of chemicals and resins based on the ICIS Supply and Demand database.

Adjustments were made to each category to reflect only production likely to be impacted by 1) reduced demand from lower resin production, and 2) the reduced availability of ethylene and propylene from NGLs.

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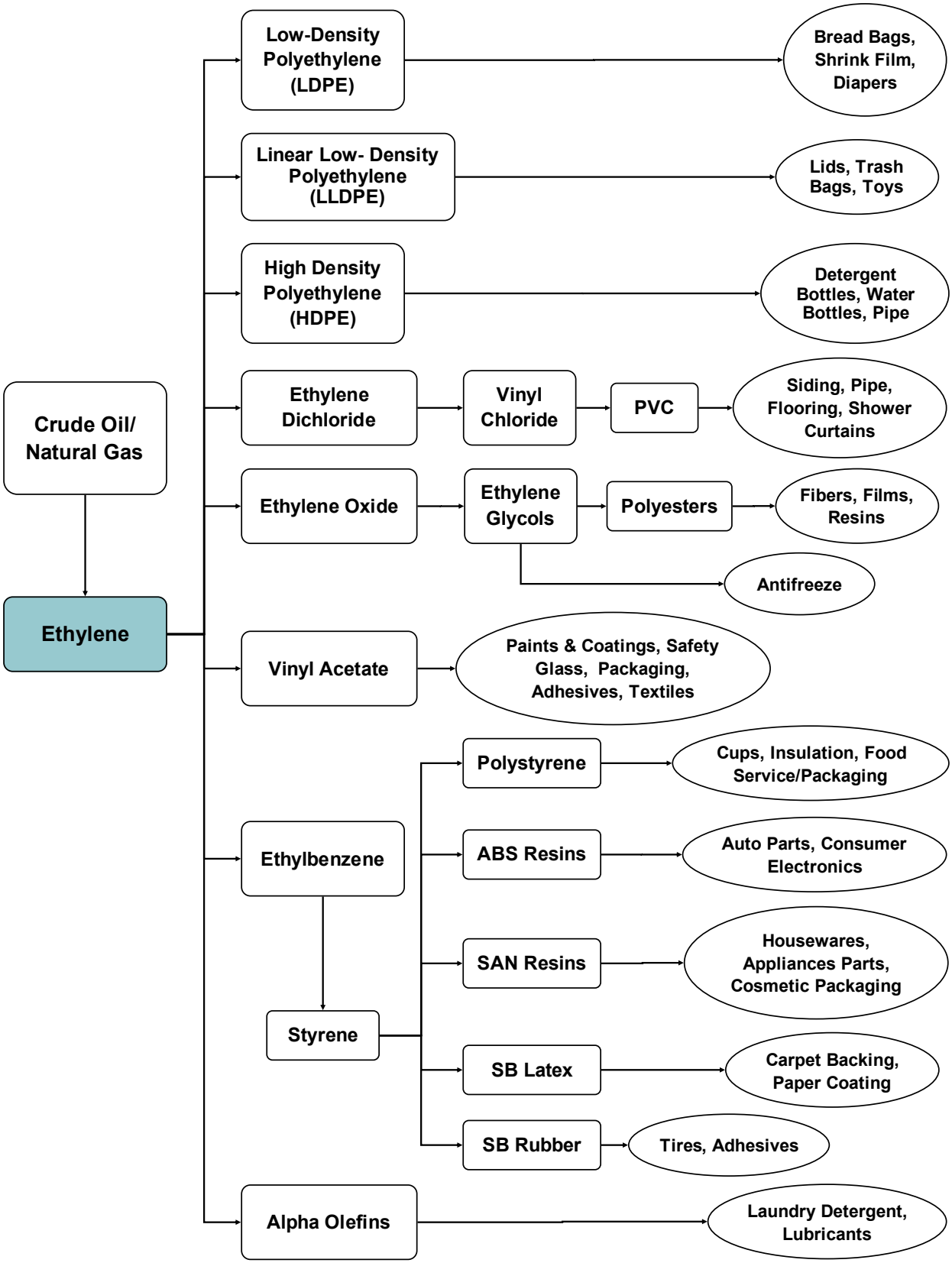
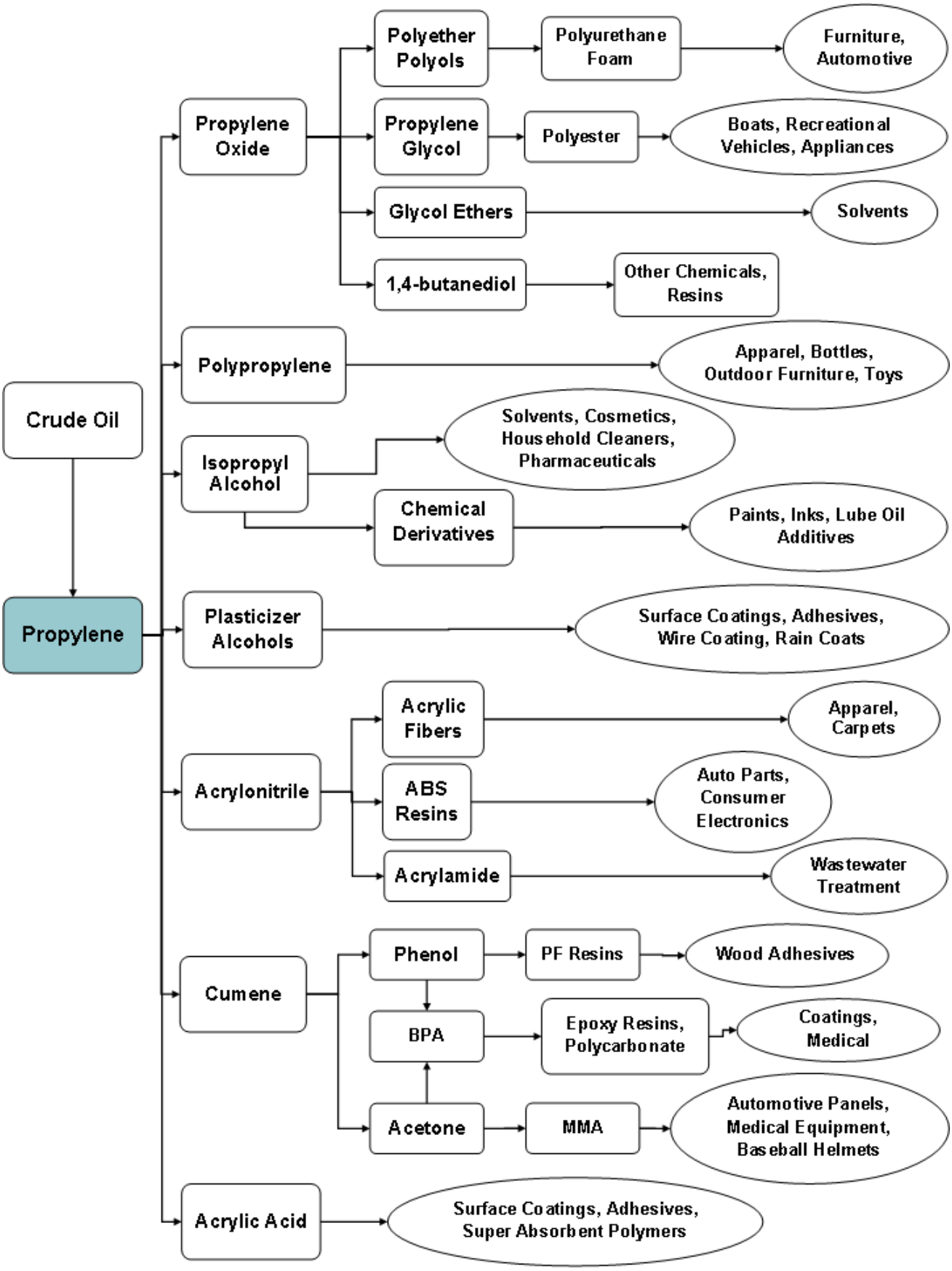
[5] https://www.implan.com/

Appendix: Chemical Derivative Chains for Ethylene and Propylene




Crude Oil
Propylene
Propylene Oxide
Polyether Polyols
Polyurethane Foam
Furniture, Automotive
Propylene Glycol
Polyester
Boats, Recreational Vehicles, Appliances
Glycol Ethers
Solvents
1,4-butanediol
Other Chemicals, Resins
Polypropylene
Apparel, Bottles, Outdoor Furniture, Toys
Isopropyl Alcohol
Solvents, Cosmetics, Household Cleaners, Pharmaceuticals
Chemical Derivatives
Paints, Inks, Lube Oil Additives
Plasticizer Alcohols
Surface Coatings, Adhesives, Wire Coating, Rain Coats
Acrylonitrile
Acrylic Fibers
Apparel, Carpets
ABS Resins
Auto Parts, Consumer Electronics
Acrylamide
Wastewater Treatment
Cumene
Phenol
PF Resins
Wood Adhesives
BPA
Epoxy Resins, Polycarbonate
Coatings, Medical
Acetone
MMA
Automotive Panels, Medical Equipment, Baseball Helmets
Acrylic Acid
Surface Coatings, Adhesives, Super Absorbent Polymers