

Oil and Gas. Practice, practice...

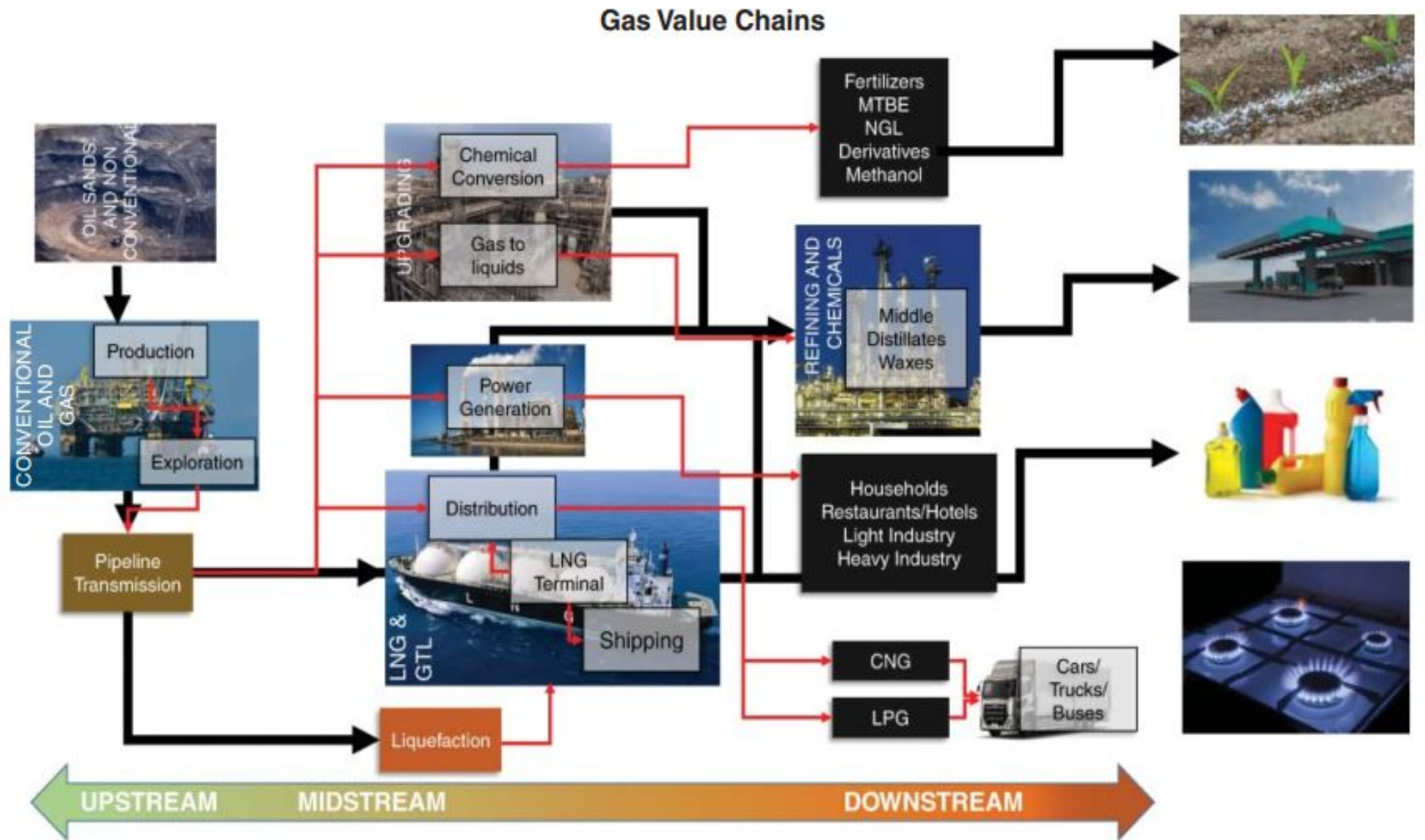


Figure 1.3 Natural gas chain from the upstream to the downstream.

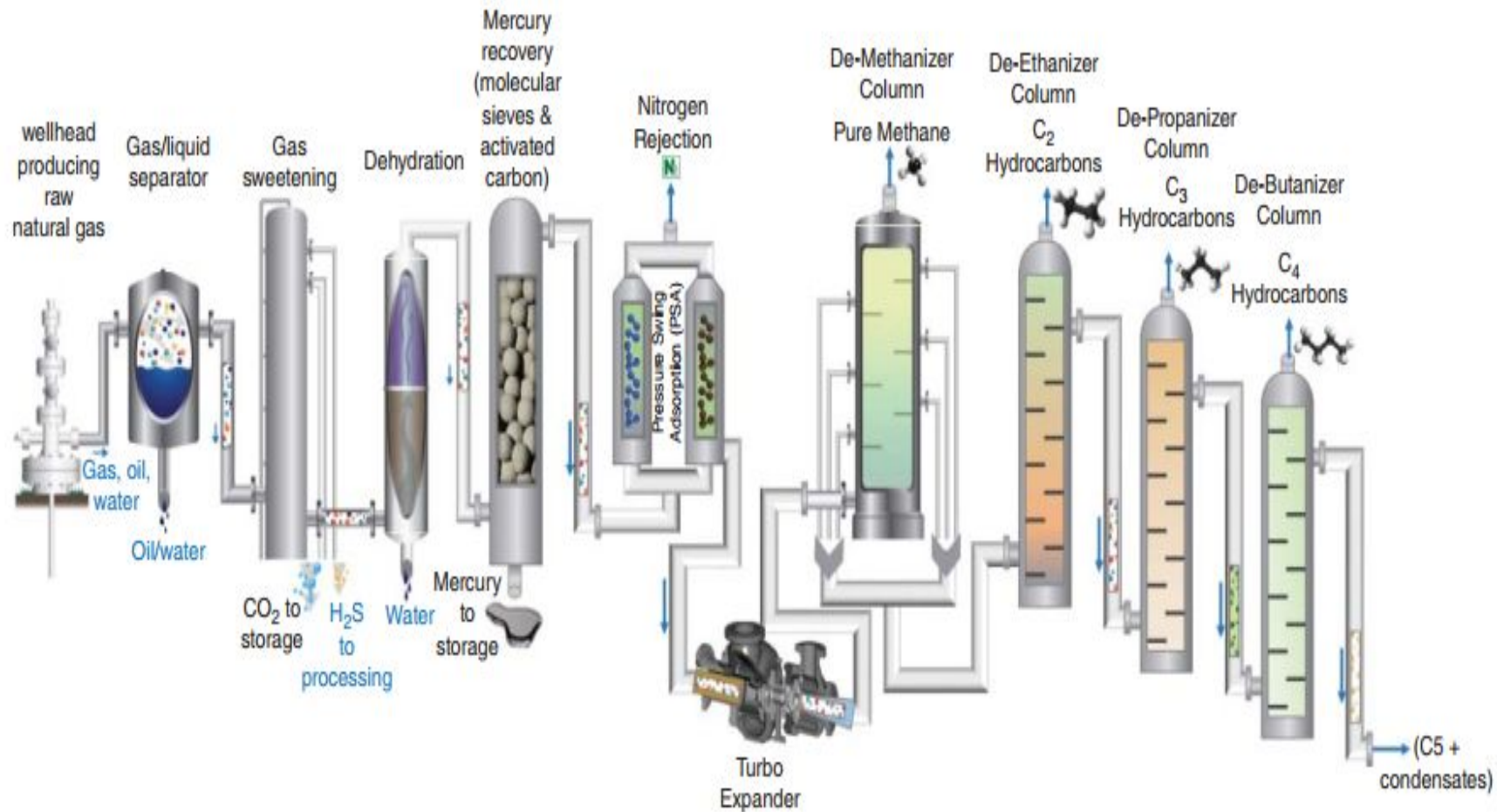


Figure 1.4 The processes of midstream natural gas plant.

- **The industry and the power plants sector account for the highest monetization of natural gas compared to others [5]. Specifically in the United States, coal began modestly in 2008 and dropped from 48.21% to 33.18% in 2015. Coal lost 15 % of the market, while natural gas increased 11% in the same period, as shown in Table 1.2. Renewable sources (not including solar and hydropower) increased 3.6% to 6.7% overall. The electricity sector is a major emitter of CO₂ in the United States, and it is assumed to be responsible of 29% of global warming emissions.**
- **Coal is the major source for these emissions, and therefore natural gas and renewables emerged to substitute for coal in this sector [6, 7]. That results in natural gas and renewables picking up 14.8% of the market (i.e., or ~99% of the market lost by coal). In 2016, natural gas become the major sources of electricity in the United States (~34%) followed by coal (30%), nuclear (~20%), and the renewables (~16%) [8].**

Table 1.3 Advantages and disadvantages for monetizing natural gas in industry and power plants.

- **Main advantages**
 - **Creates economies of scale (large individual offtakes)**
 - **Offers good load factor**
 - **Can avoid costly treatment facilities as gas quality is not usually critical**
 - **Provides basic gas infrastructure for subsequent expansion**
 - **Requires no storage on users' premises and avoids waste disposal problems**
 - **Uses conventional technology**
 - **More eco-friendly (no SO_x and less NO_x and CO₂ emissions, no particulates, etc.) than coal and most oil products**
- **Disadvantages and constraints**
 - **Possibly lower value in competition with coal, fuel oil, hydro, etc.**
 - **Load factor may be low if the end consumer installs dual-fired capability or buys gas on an interruptible basis.**

- **Table 1.3 lists the main advantages and disadvantages of monetizing natural gas in the large industry and power plant sectors. The major advantage is that natural gas doesn't require an expensive midstream treatment, while the major challenge is the low load factor due to the use of dual-fired generators, which is common practice in many places.**