Appendix:

Redesigning Life – What is Synthetic Biology

Through designing, rewriting, and modifying microbial genomes on a large scale, synthetic biology can solve problems in treating diseases, effective bioprospecting, and efficient biomanufacturing. DNA replication is essential to the propagation of life, but during the process, genes can sometimes be destroyed or disrupted. Nevertheless, the genome remains mostly unchanged.

Thanks to the constant developments in the synthetic biology field, we can now design, rewrite, and edit genes from scratch, similar to writing a document on the computer. The ability to design a lifeform completely changes the interactions between human beings and life on Earth. Synthetic biology allows DNA to be used as a raw material for products in an unimaginable way, such as scarce drugs, non-renewable fuels, and highly-polluting textiles. Our daily foods and condiments can be redesigned and manufactured at a molecular level in a similar fashion.

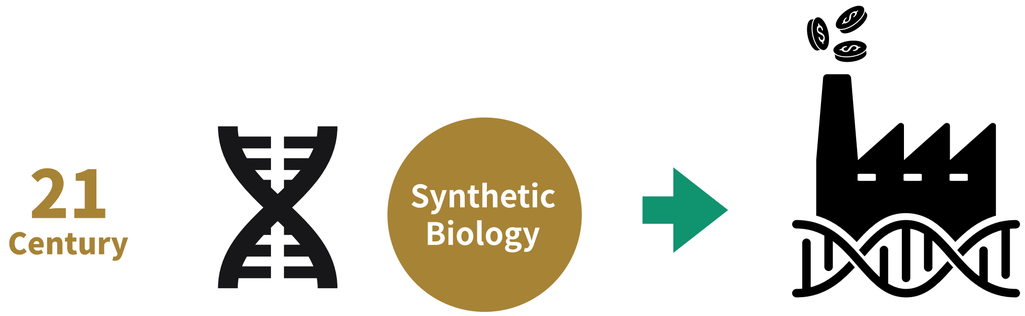
This technology will bring changes beyond imagination. Looking back, since the Industrial Revolution, we have experienced a significant wave of technological and manufacturing innovation. Especially in the 20th century, supported by the exploitation and use of fossil fuels, the world has achieved tremendous developments and unprecedented economic growth. At the same time, their inefficiency has led to the destruction of immeasurable forests, lakes, and other natural resources. In particular, in the process of burning fossil fuels, carbon atoms accumulated over the past billions of years are released to the atmosphere, increasing greenhouse gas to a disastrous level. To address this issue, synthetic biologist can easily turn microorganism to a “bio factory”, solving the problems of inefficient production and environmental damage caused by the use of fossil fuels.

In addition to biomanufacturing, synthetic biology has received much attention in the medical field. Bounded by the Eroom’s Law (opposite of the Moore’s Law) in the pharmaceutical sector, the number of new drugs approved is declining rapidly despite the rising R&D expenses. This inefficiency provides synthetic biologist a massive potential in the medical science field, particularly in immunology field where immune cell genes can be redesigned to fight diseases more accurately. In the future, cell and gene therapy will undoubtedly become essential partners for doctors.

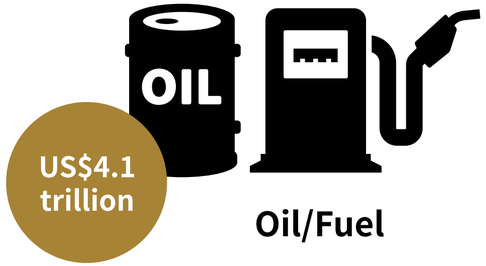
The Crown Jewel Of Our **Economy** — **Synthetic Biology**

The Future Fueled By DNA Based Feedstock

“ MORE GOOD LESS HARM ”



Synthetic Biology To Disrupt Potential Addressable Markets For All Industries



And more