

Enhancing further the value of our carbon-based resources

**Carbon to Products Seminar
(BCIA & FedUni)**

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Professor Leigh Sullivan

Why use carbon based resources to enhance the regional economy?

Our region has an exceptionally favourable abundance of carbon-based resources.

The utilisation of these resources for purposes such as energy generation and high-value paper products has for a long time underpinned the economic viability of our region, Victoria and beyond.

Long may (and can) this continue.

An industry of the future built on the past

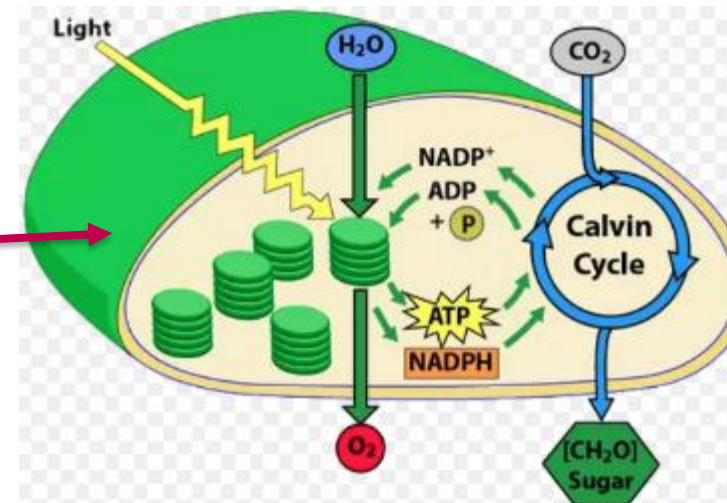
Converting carbon-based resources to useful products has underpinned the development of economies and societies since history began.

For example, carbon-based resources have been and remain the major source of e.g.:

- * energy to drive our societies.
- * our food.
- * our building materials.
- * our clothing.

Why Products from Carbon?

Photosynthesis is an ideal process for the conversion of the most basic and renewable energy in our universe (sunlight) into carbon products from which we can derive food, energy, shelter both at a time of our choosing, and in a way that we prefer.



Why Products from Carbon?

The energy from photosynthesis is 'stored' in a wide range of plant-derived products including foods, fibres, wood, oil, and coal.



Why Products from Carbon?

Carbon-based processes and resources can efficiently:

- store energy in convenient forms
- create an immense array of materials of critical importance

Plants have been effectively doing this for the past 450 million years!

Why Products from Carbon now?

We naturally are comfortable when our business models are working well.

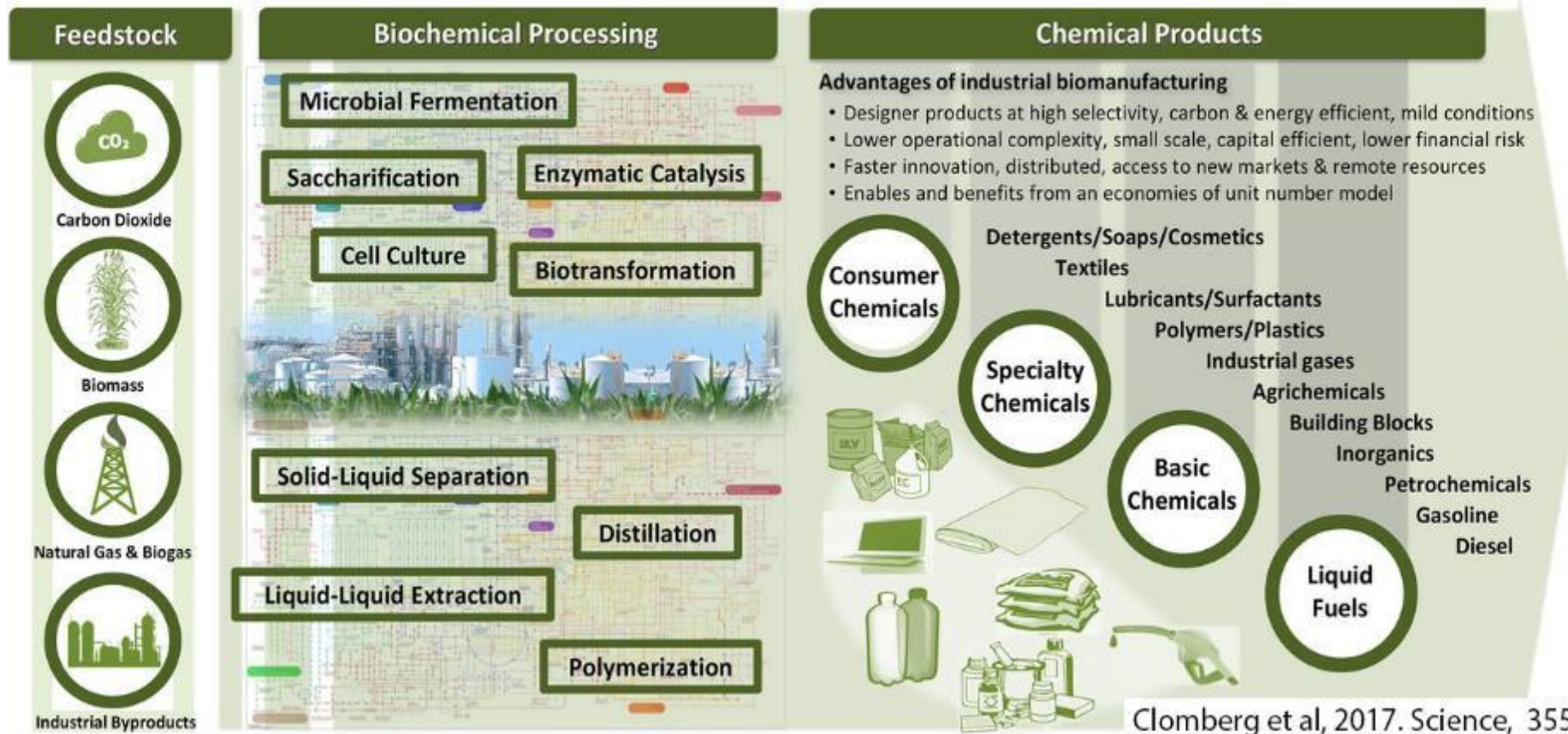
Under such circumstances the tendency is to think that this is the only viable or only necessary use for such as resource.

Why Products from Carbon now?

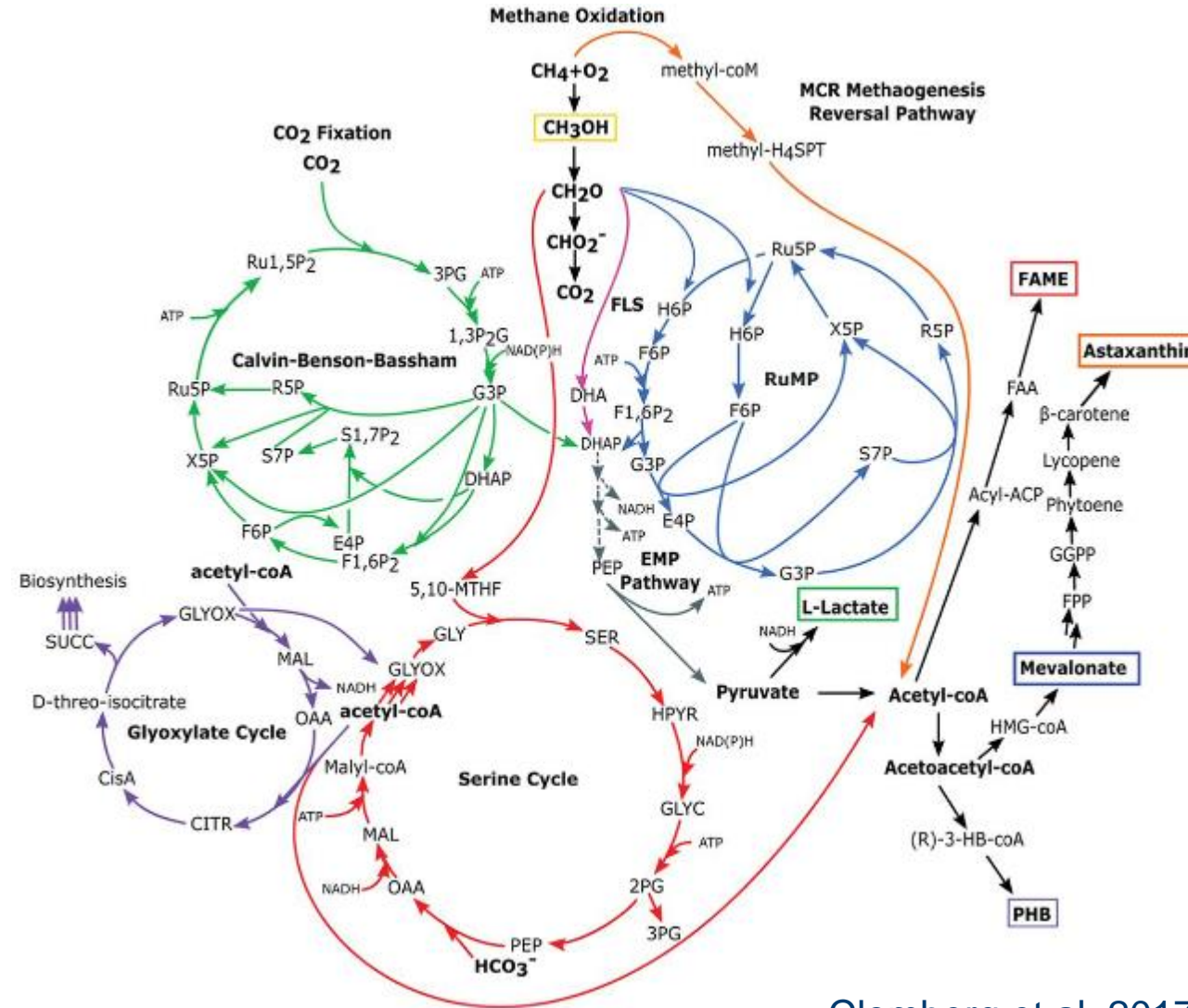
Our carbon-based resources of brown coal, food and fibre crops, wood, 'waste' materials have the potential and, increasingly this is a demonstrated potential, to be turned into a dazzlingly-wide range of high value commercial products.

As later speakers will attest such carbon-based resources have the clear potential to successfully manufacture a wide range of high value products.

Industrial biomanufacturing: example of one approach



Biochemical manufacturing utilising a single simple C-source



Clomberg et al. 2017. *Science*, 355.

Why Products from Carbon?

The potential of carbon-based resources for a wide range of viable purposes is not speculative, it is becoming increasingly demonstrable.

Other opportunities for brown coal

Source: Earth Resources (Victorian Government 2016)

Solid products

- Drying to a high-energy exportable fuel.
- Chars and cokes for pyrometallurgy.
- Ion-exchange medium for water purification.
- A range of carbon products including: carbon fibres; carbon anodes; activated carbons; filter aids; pigments; graphite lubricants and conductors, and; formed carbon materials.

Other opportunities for brown coal

Source: Earth Resources (Victorian Government 2016)

Liquid products

- Liquid fuel products including: diesel; methanol; fuel gasoline blends, and; high-octane gasoline extenders.
- Non-fuel liquid products including: solvents; polymers; surfactants; lubricants and; a suite of other carbon-based chemicals.

Other opportunities for brown coal

Source: Earth Resources (Victorian Government 2016)

Waxes, resins and polymers

A wide range of:

- waxes
- phenolic resins and plastics,
- composites,
- structural and building materials.

Other opportunities for brown coal

Source: Earth Resources (Victorian Government 2016)

Agricultural products

Including:

- Soil conditioners
- Fertilisers

Regional Carbon Innovation Centre initiative

One of the exciting joint activities between BCIA and FedUni is the proposed local development, with a range of partners, of a Regional Carbon Innovation Centre (RCIC).

The aim of the RCIC is to provide affordable and readily accessible support to entrepreneurs, SMEs and existing industries in the carbon-resource sector to allow them to penetrate and grow their target markets.

A Regional Carbon Innovation Centre would:

- Lower the cost of developing products by provision of shared testing and analytical facilities
- Enable shorter lead times from design to market
- Encourage both innovation and sharing of innovation across market sectors
- Provide an ongoing pathway for local jobs and training opportunities
- Produce 10-20 direct ongoing jobs as result of commercialisation
- Help attract investment to the region

A Regional Carbon Innovation Centre would help our region capitalise on the distinct competitive advantage that it has in carbon-based resources and continue to help drive a bright future for our region.

Over the course of today we will hear from leading experts from both universities and industry in the conversion of our carbon-based resources to high-value outputs.

This will include presentations on:

- the development of high value products for agribusiness,
- the production of innovative fuels and organic liquids from lignite,
- carbon capture technologies, and
- how to create the best climate for investment in these industries.

Finally I am looking forward very much to the final discussion from a panel consisting of distinguished local, regional and national community leaders, who will examine what the next steps need to be for the further enhancement of the carbon economy of our region.

Federation University is committed to assist and collaborate with our carbon-resource based industries to ensure our region's continued success both now and into the future.

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