WILLOW POND

A Case Study of a Low-Carbon Future Through Residential Self-Sufficiency in the Year 2050

Bruce Tonn, Baker Center

Dorian Stiefel, Dept. of Political Science

University of Tennessee

Original Willow Pond Subdivision

Circa year 2000: Totally unsustainable

Drivers of Residential Self-Sufficiency

- Volatile Food and Energy Prices and Supplies
- Economic Globalization
  - Pressure on wages
  - Lack of middle class jobs
  - Overall employment uncertainties
- Frustration with politics at all levels
- Concerns about the environment
- Convergence of technologies: nano, bio, info, energy, manufacturing, energy, cognitive science
- DIY & collaborative economics

Components of Home Energy System

- PV Skin
- Solar Hot Water
- Solar Heating Panels
- Mini-wind turbines
- Thermal energy storage
- Mechanical energy storage
- Storage batteries
- Net meter to central Willow Pond system
- Hydrogen-producing algae
- Biomass composter – methane
- Home fuel cell
- Geothermal energy system
- Compressed air energy storage
- AI energy production, storage and smart house system

Components of Local Manufacturing System

- Recyclable and reusable plastics, aluminum, glass, steel, graphene
- Reusable carbon legos, nano-yarns
- Renewable wood, transgenic silk, fibers
- 3D printers
- Automated assemblers/ disassembers
- Sprawl Farm
- Re-designed yards

Other Features of Willow Pond

- Electric vehicles
- Immersive and pervasive telecommunications
- Largely closed-loop water systems
- Re-designed community space
- Central and dispatchable energy storage system co-located with the Sprawl Farm

Residences


LivingLight at Shelby Farms in Memphis, TN


LivingLight Interior in Morning Sun

3D Printers

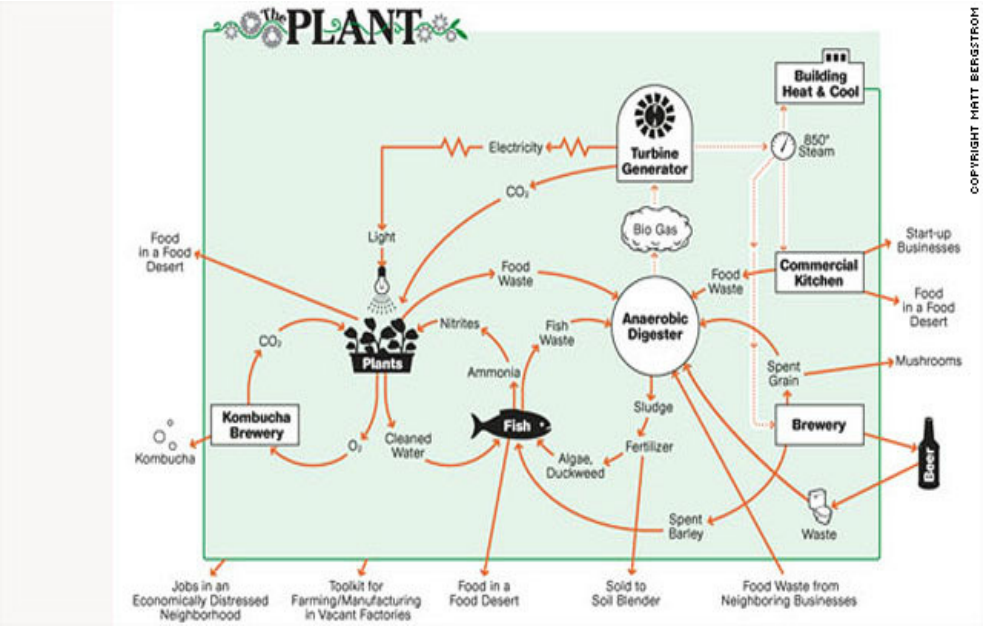
Carbon Legos*

* Please use your imagination!

Vertical/Sprawl Farms

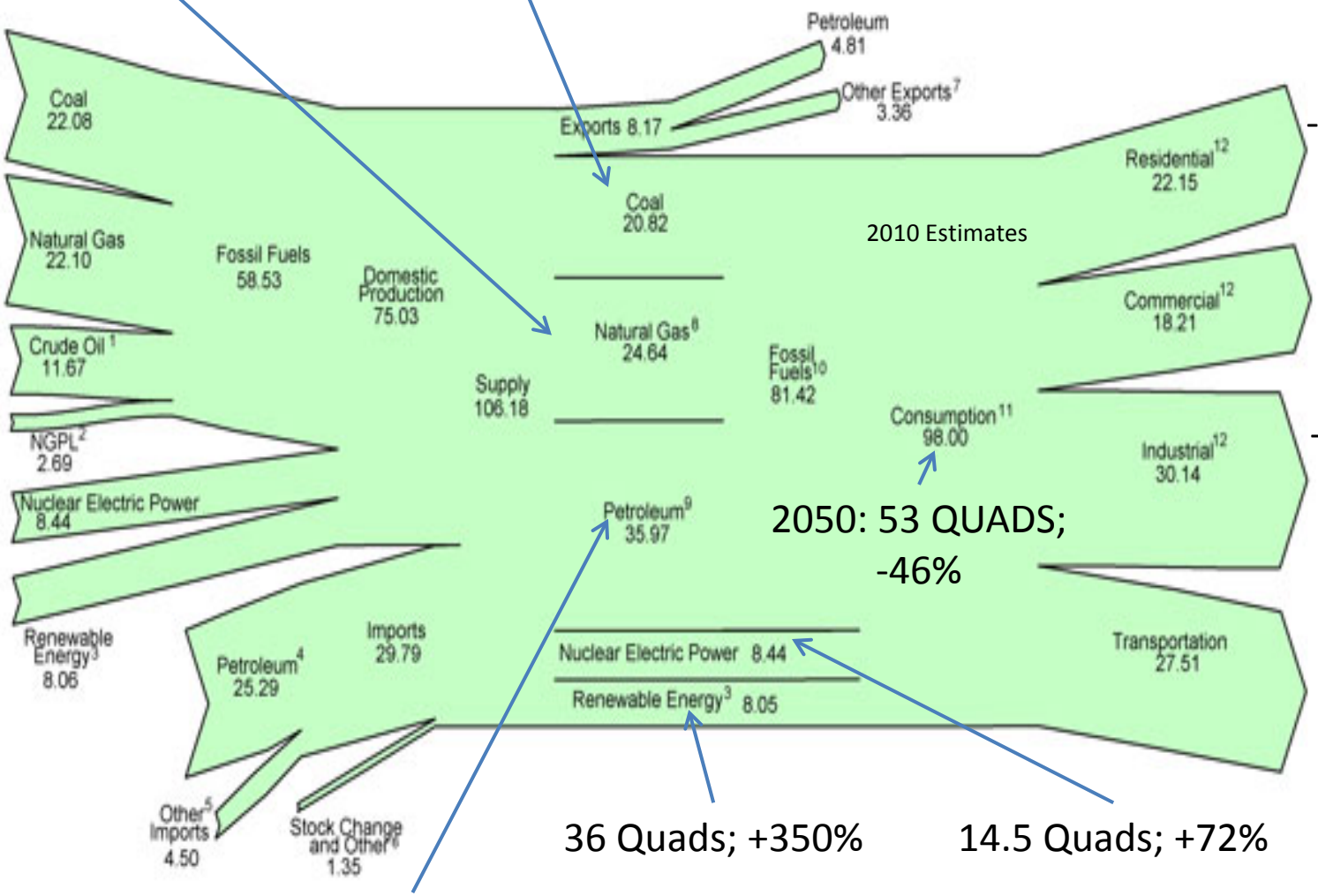
Imagined

Taking Shape in Chicago



Re-designed Yards and Homes

Pathways to a Low-Carbon Future*



-20%, improved efficiencies

-50%, fewer buildings

-60%, almost zero virgin materials

-48%, reduced personal travel, shipment of food, raw materials, and goods

**Extrapolating Willow Pond to the entire residential sector*

Challenges Faced by Willow Pond

- Shift from cash to collaborative local economy
- Community size (~ 150, Dunbar's #) and inclusion
- Extent of IT/AI support – strong democracy/strong system
- Managing differences of perspectives (IT, human facilitators, others taking on reprised roles in society)
- Export base and interacting with other communities
- Technology versus human capital
- Self-sufficiency versus traditional jobs
- Time allocated to household versus community production
- Ownership of Shared Resources

Public Interest Issues

- Controlled substances
- Free riders
- Poverty
- Living with wildlife
- Public education
- Others ??? (new ones emerging periodically)

Other Observations

- Improved personal health
- Increased happiness for most
- To move or not to move….
- Increased political participation
- Signs that unique subculture is emerging

Future Research

- Long-term sustainability of Willow Pond and similar communities; periodically revisit
- Impact of local economic self-sufficiency on national and regional economies (e.g., funding investment in major infrastructure)
- Impact of self-sufficient communities on culture and politics