



UNLOCKING A NEW MARKET NICHE IN TRANSPORTATION

Background:

Our ultimate motivation is the very fast reduction of carbon emissions. As experts on understanding systems and redesigning systems, we analyzed the carbon crisis system and concluded that the most effective “systemic acupuncture” intervention is transportation. The way we do transportation determines the way we do cities, and transportation and cities account for perhaps 1/3 of the carbon problem. Then, we analyzed the transportation system to determine what it should look like in order to achieve the desired results of decarbonisation and exponential growth: A decarbonized transportation system must grow exponentially in order to be relevant for global decarbonisation. For a new transportation system to grow exponentially it must be easy to develop and build, unquestionably better than present and emerging systems in the eyes of the users, it must be a “no-brainer” for governments and it must be extremely attractive to investors. We therefore worked on the concept for a new transportation system that could bypass the main obstacles to decarbonisation and to fast development of technology and transportation infrastructure. This concept has the support of the Chancellor and the Dean of Engineering of the University of California, San Diego, and our intention is to hand it over to an industrial partner for the engineering and manufacturing development to bring it to market in a very short time.

Summary:

There is an unoccupied, multi-billion-dollar niche in the transportation market. Today, there is no public transit that can be built and operated without subsidies, at high capacity (7,000 -20,000 pphpd), with all non-stop trips at high speed (trip average over 100 km/h), at low cost (at present public transit rates), in dense urban centres, between urban centres and to suburbs. If there were such a system, it could quickly be adopted in thousands of cities that urgently need public transit, and it could replace and expand most present transit networks in North America and Europe where housing affordability is driving people away from the centres of business and opportunity.

To enter this market niche, we are proposing a product and a driver of demand for this product. The product is an innovative, extremely simplified, high-speed PRT that very significantly reduces costs, footprint and development time. The inherent and first driver of demand will be the lower costs, higher speed and greater convenience of the transport. We propose the introduction of an additional driver of demand in the form of the exponential development of affordable housing in Transport-Oriented Developments (TODs) which require a very specific transportation system with features that are not provided by present transports. We have developed the process for facilitating the exponential development of TODs, and the concept for the transportation system. We now need an industrial partner to develop the PRT and an investor in our startup that will simply connect stakeholders to facilitate the exponential development of TODs.

The concept

By simplifying a Personal Rapid Transit system (PRT) to its minimal expression, we can reduce its physical footprint and costs to the point that it can be permitted much more easily and built anywhere with no government subsidies. Such a PRT would be ideal for cities of any density, and to connect urban centres with other urban centres and with remote areas. In urban areas, this PRT would have a footprint, cost and permitting advantage, and in remote areas, a fast, low cost transport would open vast areas of low-cost and

lower-regulatory requirements for the development of affordable housing. There are some 4,500 cities worldwide with populations over 100,000 but less than 5% of these have transit networks that are immune to traffic congestion. A zero-subsidy, profitable, unobtrusive transit system would be a no-brainer for all of these cities. And we can additionally drive the demand for such a transportation system by catering to the urgent and massive need for affordable housing through enabling Transit-Oriented-Developments that are made accessible with a brief, highly convenient commute to and from downtown.

The product:

A highly simplified PRT reduces the time and cost of technology development, and reduces to a minimum the infrastructure and therefore costs and footprint. Very low costs and footprint facilitate investment and permitting, the two main obstacles for transportation infrastructure projects. Our technological solution is the first and simplest version of a proposal that is backed by UCSD, for three levels of technological sophistication and increasing speed. The simplest version of the system comprises a very small, light vehicle powered by a small electric motor, suspended magnetically from a very simple one-rail guideway, supported by light poles. Our innovation in this instance is the very simple magnetic suspension, which enables the simplification of all other components and systems. We believe this system could operate at sustained average speeds between 100 and 130 km/h over all-non-stop trips. Our concept has the advantages of an extremely simple and reduced infrastructure, very low costs (very probably below \$1 million per kilometre), high speeds, trivial track-switching and low technology that can be manufactured and built easily and anywhere.

Development of the technology:

The technology at present is at the concept level, and we have a provisional patent application for the simplest version, one patent pending for a traffic and routing control system, and two patents pending for the next two levels of speed and technological complexity of the PRT system. We have letters of support from the Chancellor and Dean of engineering UCSD, for developing the basic engineering at UCSD. We also have a verbal agreement with Maxon to build a proof-of concept prototype. The real development of the engineering and bringing to market of the product will be done by an industrial partner that we hope will be Magna. The investment required will depend on the degree of involvement of the industrial partner, who may choose to enter at the earliest stage (now), or after the basic engineering has been done by a third party such as UCSD.

Investment:

We require investment for two main purposes: first, possibly developing the basic engineering and possibly developing a proof-of-concept prototype, and second, for developing the business-development startup to drive exponential demand for the transportation system and thereby make it useful for decarbonisation.

Market:

The transportation market, especially that which requires new infrastructure, and especially in dense urban centres, is hindered by very slow permitting processes involving bureaucracy and the need for public approval; by the need for subsidies and the lengthy and complicated processes for allocating government funds; and by lengthy processes of technology development and certification. While this process is very slow, sometimes in the order of decades, the urgency for electrifying and revolutionizing transportation is greater than ever. Furthermore, the electrification of cars does not by itself guarantee that the electricity



will be from non-fossil sources. Therefore, the evolution and growth of transportation is lagging behind massive, urgent needs, and major business opportunities are thus being generated.

We intend to unlock a new market. There is a very large transportation niche that is not filled now: 4,500 cities that need radically better public transit and at least 20 mega-regions for which housing affordability is a massive demand-driver. At 60km/city and \$2 Million per km (bidirectional), this is at least a half-trillion dollar market.

This market niche requires:

- Sustained speeds over 100 km/h
- Capillarity comparable to personal cars or the best transit systems in the world (London is designing for a 250m walk for health and quality of life)
- Capex and Opex that enable no government subsidies and all (competitively profitable) private investment
- Centralized or at least controllable energy source to ensure that it will be clean energy
- Reduced and/or simplified need for right-of-way
- Small footprint so that it is unobtrusive and can be built anywhere, including dense urban centres
- Fast development time to reduce investment risk and allow an early or first entry to market

No technology in the market provides these features, and we expect our technology to easily meet or exceed all of these requirements. For any technology innovation in public transit, we expect most governments to be very interested, but to want to not be the first adopter of the technology. To this end, we have identified a number of projects with interest in being the first adopters, or with a combination of great urgency and low-regulatory environment. In the first case, we have the manifest interest of the Chancellor of UCSD, Pradeep Khosla, for building a line in or to UCSD. In the second case, we have identified and approached two projects in Mexico: the city of Cancun, which currently has an open call for proposals and which urgently needs a fast, unobtrusive transit solution, and the city of Tijuana, which has not been able to find a technology suitable for the right-of-way that it has already granted for a Tijuana-Rosarito line.

Disruption:

Public transit is not evolving at the pace that cars are, and the need for radically better public transit continues to grow. A transportation system that is unobtrusive can be built in months instead of years, can be built anywhere including the densest urban centres. A transportation system which is so cheap that it can be profitably built and operated with private investment and no government subsidies, has all the potential to be highly disruptive. This niche is empty for now, but we must presume that there are others, possibly even car manufacturers in China or India, who have identified the same market opportunity and who might be finding solutions at least as good as ours. Therefore, time is of the essence: to take advantage of the opportunity to disrupt in this market, the first-to-market advantage is important, especially with an exponential-by-design business model.

Business Model:

Our business model is to find solutions to a very complex problem, turn them into a compact, elegant concept, and hand them over to a top industrial partner who can do, in a very short time and with a very high level of quality, the engineering, development and manufacturing of the product. We, Keystone, continue on as a business developer, focused on fueling the exponential demand for the product, mainly



through the affordable housing and purpose-driven TODs market. Keystone will make money from licensing the patents of the concept to the industrial partner or partners, and from a very minor share in the equity of the developed TODs.

We are looking for:

1. An industrial partner who can very rapidly develop the technology and bring the product to market. If this industrial partner can fund the development of the technology, we would offer the right-of-first refusal for supplying the product, and engage other industrial partners only if needed to meet additional demand.
2. An investor to fund the development of the technology, If the industrial partner will not fund this development.
3. A quote from Magna for the cost of developing the technology if Magna will not fund it.
4. An investor in our TODs startup.

The founders:

We are:

- Juan Pablo Rico and Arturo Farias: Keystone Humans Inc. incorporated in Delaware, and Witherby Howe Consulting Inc. ("Keystone Ventures") incorporated in Vancouver.
- Motivated by our purpose to make a very significant contribution to decarbonisation through leveraging the forces of the market to drive the exponential change required.
- Seasoned entrepreneurs, self-disciplined, used to working hard and being persistent, always aiming high, realistic and highly optimistic.
- Not interested in founding and leading "the new Tesla" (huge company, build and manage large factories, huge egos, etc.).
- Experienced in managing large teams, but not interested in leading a large corporation.
- Interested in being a small think-tank team that continues to create innovative concepts and that assembles and coordinates ad-hoc consortia.
- Interested in creating very significant value but not interested in trying to capture "the lion's share" of the added value for ourselves.
- Experienced in the corporate world and in management consulting.
- Experienced in assembling and leading multidisciplinary teams and consortia for solving very complex problems with high economic, social and environmental impact.
- Experienced in developing concepts for systemic solutions, and handing them over to experts to develop the implementation.
- Focused for the last 5 years on sustainable transportation and urban development.
- In a strategic alliance with Safdie-Rabines for developing TODs in North America, and intending to enroll the services of Rebuild by Design, of NY, with whom we have collaborated extensively in large urban development design projects. Our role will be to provide a process and system based on our experience, to connect stakeholders to facilitate the creation of TODs.