



# Energizing Innovation<sup>TM</sup>

for wearable devices & connected sensors

DNB Nordic TMT & Consumer Virtual Conference  
2 September 2020



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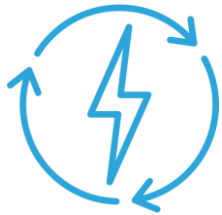
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Thinfilm financial reports may be accessed via the following web page:

<https://thinfilmsystems.com/investor-relations/presentations-webcasts/>

# our focus – superior energy density, longer life

Disrupting the market with steel, stacking, scale



## Designing & manufacturing premium microbatteries

- > 2x energy density
- 2-3x recharge cycles / lifetime
- Safer than Li-ion



## Leveraging proprietary IP & unique technology platform

- Unmatched expertise on steel
- Validated roll-to-roll process
- Multi-cell stacking innovation
- Company owned, fully equipped ISO9001 facility




## Addressing unique market requirements

- Form factor & energy density for wearables
- Long lifetime & reliability for hearables and connected sensors

# market overview

## Focus

Microbattery  
mWh - Wh



1Bu, \$3-4B


## Future

Mid-market  
Wh - kWh



## For others...

Bulk storage  
MWh - GWh



**Energy density**

**Volumetric**

600 → 1000 Wh/l

**Volumetric**

1000+ Wh/l

**Gravimetric**

Wh/kg

**Product highlights**

Ultrathin form factors  
Long lifetime  
Application-specific pricing

Standard form factors  
Rapid charging

Maximum capacity  
Commodity pricing (per Wh)

**Technology platform**

Solid-state chemistry  
Roll-to-roll steel  
Stacking innovation

New anode  
Electrolyte improvement

Gigafactory

# microbatteries – our entry market

Established, growing markets; well aligned to existing factory

## Initial focus

### **Medical Wearables**

**150M Units**

Continuous glucose monitoring, temperature monitoring, physiological monitoring

### **Hearables**

**350M Units**

Hearing assist, wireless headphones

**1B  
Units**

## Subsequent expansion

### **Connected Sensors**

**250M Units**

Environmental sensors, commercial smart buildings, smart manufacturing

### **Sports & Fitness Wearables**

**350M Units**

Activity measurement, smart apparel

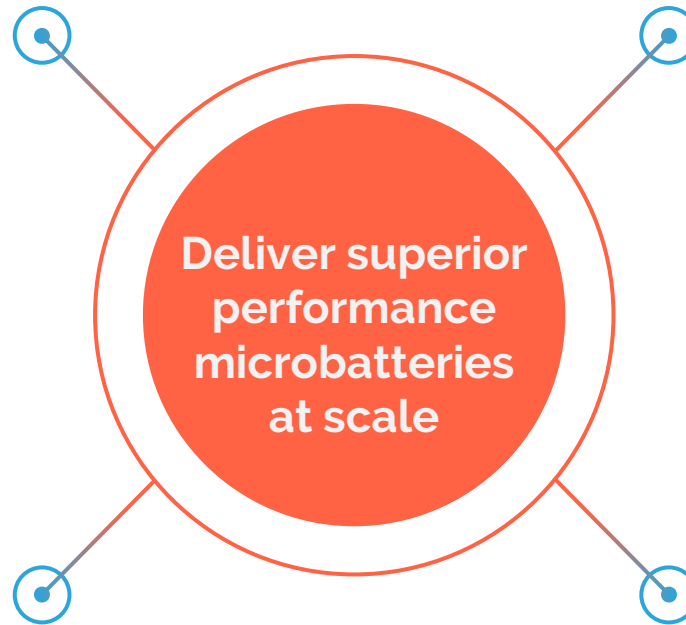
# novel architecture transforming microbatteries

## Established anode-less solid state chemistry

- Invented in 1990s
- Requires no further invention
- Demonstrated entitlement energy densities within months

## Proven ultrathin steel substrates

- Proprietary Thinfilm development
- Reliably shipped millions of EAS units
- Roadmap down to 10 microns



## Innovative cell stacking & packaging

- Leverages steel hermeticity
- Delivers high volumetric energy density
- Enables form factor customization

## Installed ~\$40M scale-up R2R factory

- Sheet-to-sheet development line
- Cost-effective path to high volume
- Supports technology roadmap

# delivering value to target markets



## Premium Product

2x energy density

2-3x longer life

2x charging speed

No risk of fire/explosion

Form factor options



### Hearables: lower OEM costs with longevity

SSLB 1000+ cycles (vs. 300-400 for li-ion)

- supports full nightly charge over 3-4 years
- reduces OEM warranty/service expenses



### Wearables: never-before-possible form factors

SSLB energy densities allow same battery life in ½ current volume  
SSLB shape options match wearable shape, contours

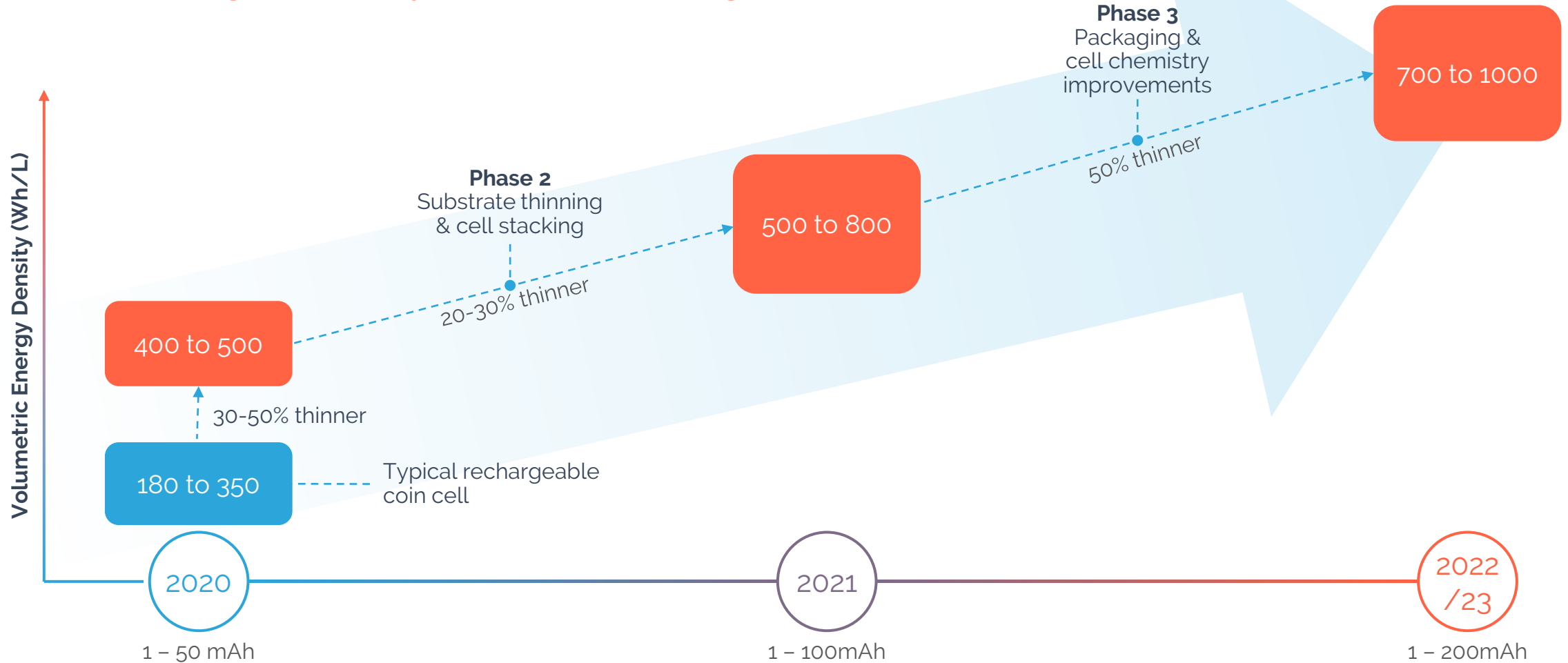


### Sensors: safe, perpetual operation

SSLB cycling enables long-life trickle charging via energy harvesting  
- minimize or eliminate sensor maintenance costs due to failed battery  
SSLB safety allows placement in hard-to-reach areas

# developing leading energy densities

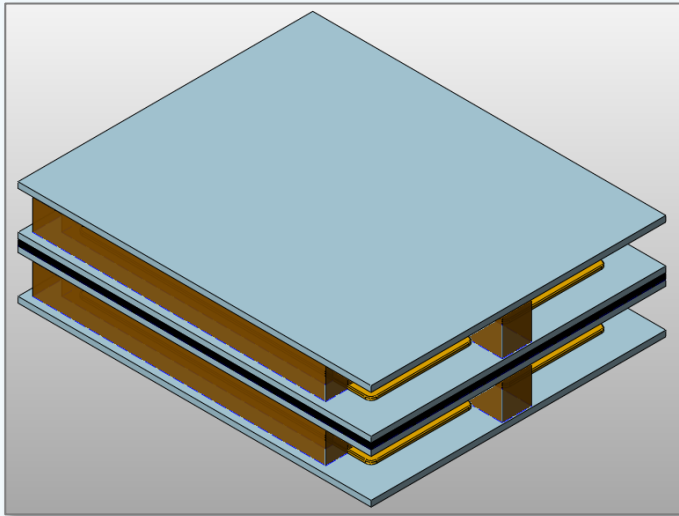
Expanding capacity while reducing thickness



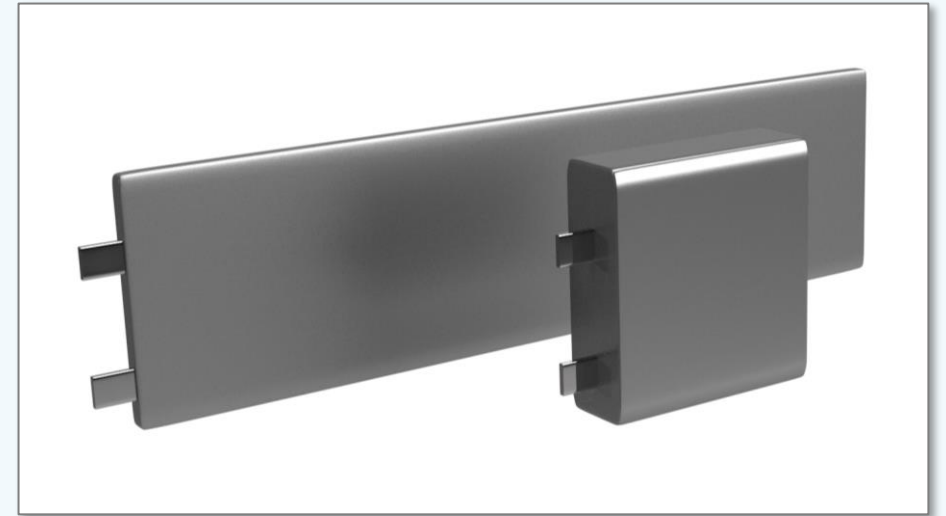


# stacking innovation to increase capacity

Unique stacking techniques



Thinfilm encapsulation IP

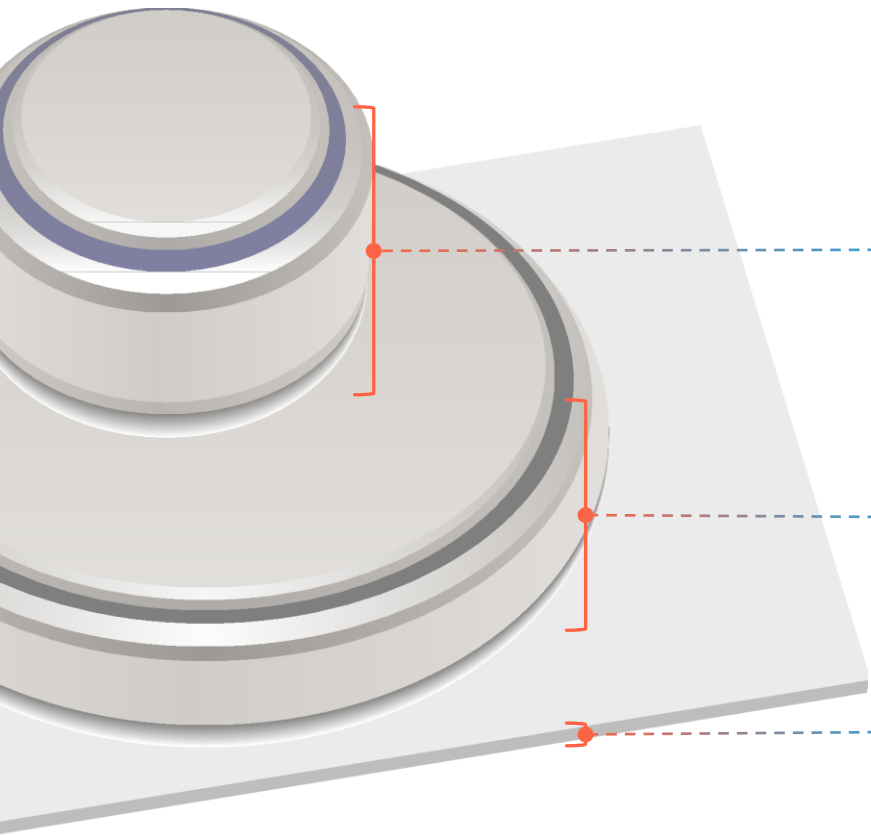


**Equivalent Energy Capacities**

High-efficiency stacking expands inherent SSLB energy density advantages to larger capacities

# providing ultrathin form factors

Dramatic reduction in minimum thickness; new shape potential



**Button cell competition**  
4600 microns thick

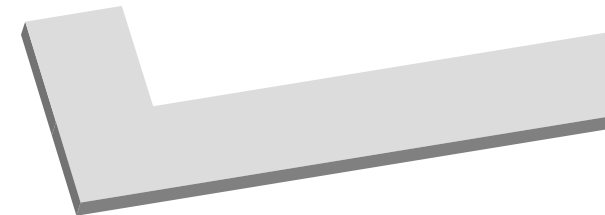
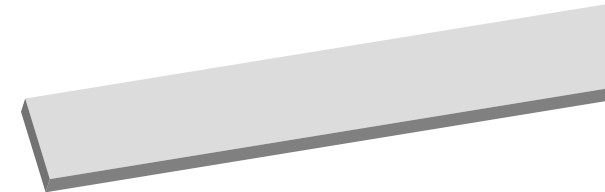
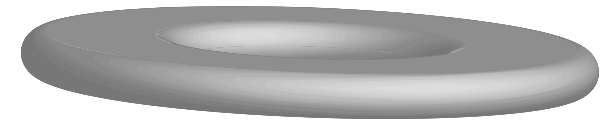
**Irregular designs**  
for new form factors

**Coin cell competition**  
3200 microns thick

**High aspect ratios**  
for strip designs

**Thinfilmm SSLB**  
45-500 microns thick

**Beyond rectangles**  
to maximize capacity



# strategic investments



## **Developing a technology & manufacturing platform within existing ISO9001-certified facility**

- High energy density, mAh-class Solid-state Lithium Batteries
- Cell stacking technology



## **Producing premium microbattery products**

- Energy storage capacity scaling to 200mAh with superior cycling performance
- Form factor options enable thinner, more comfortable wearables

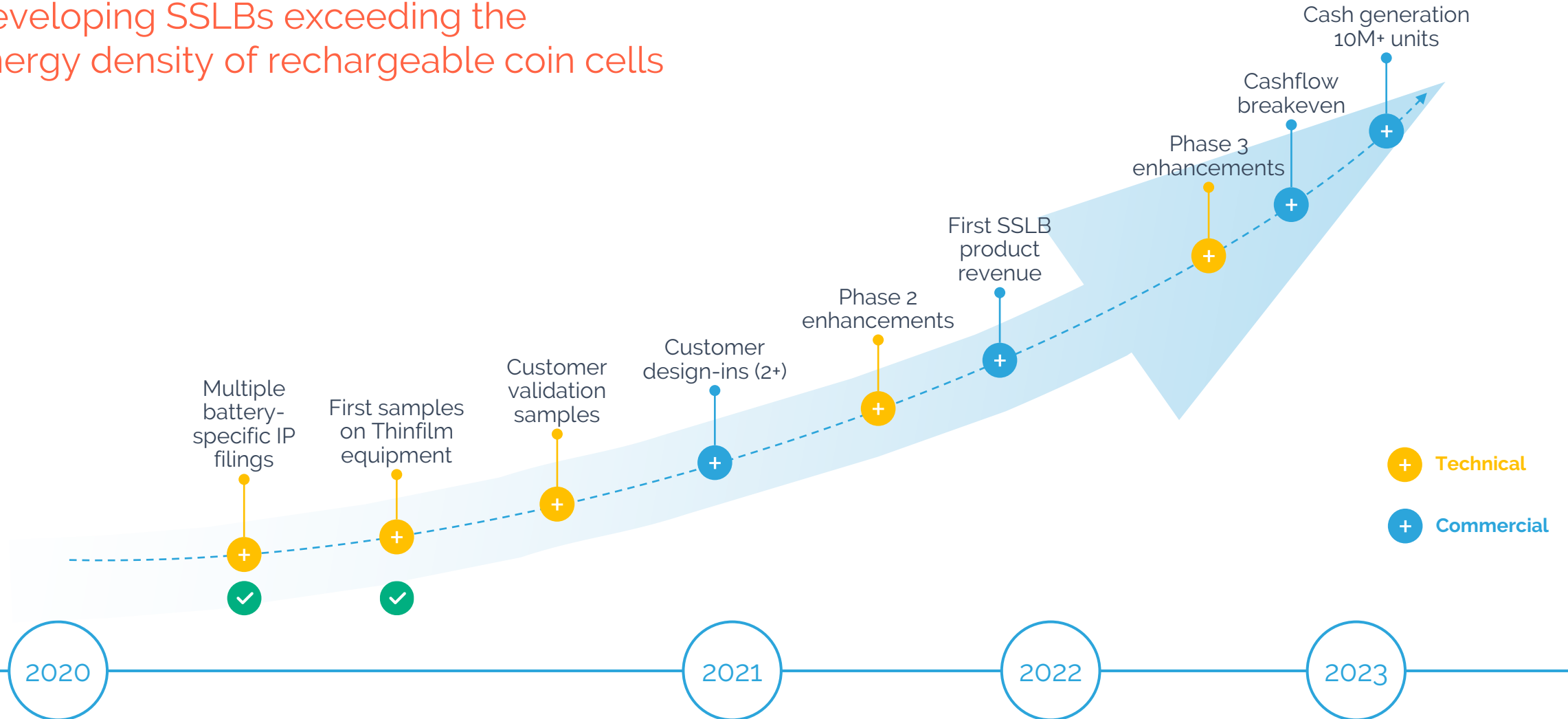


## **Executing go-to-market strategy**

- Targeting market leading OEM customers in diverse markets
- Partnering with leaders in wireless power, energy harvesting, power management

# execution

Developing SSLBs exceeding the energy density of rechargeable coin cells



# energizing wearables & connected sensors

Winning through steel, stacking, scale

## Opportunity

- Billion-unit end markets
- 3-4B USD addressable opportunity
- 1-4 USD premium pricing

## Differentiation

- Premium microbattery products
- Rechargeable with > 2x energy density
- 2-3x cycling improvement vs. Li-ion
- Safe and reliable
- Customization potential → stickiness

**Sustained cash generation based on defensible technical differentiation**

**Full factory EBITDA potential \$100M+**

# contact



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